

WARREN WEBSTER & COMPANY
Camden New Jersey
Pioneers of Vacuum Steam Heating

-since 1888
Webster
Systems of
Steam Heating

THE COMPANY



WE solicit consideration for Webster Systems, Controls and Equipment by architects, engineers and building owners on the basis of an enviable record of service, backed by 46 years of experience (since 1888), an ample modern plant and resources, and sales and service offices in over 60 United States cities and in Canada. Webster Systems have been specified by fully one-third of the country's leading architects, and installed in more than 67,000 outstanding structures by more than 2,800 heating contractors. The greater portion of the Company's business consists of repeat orders. Webster engineers are prepared and able to co-operate effectively with architects.

Products and Services

"A Heating System for Every Need and Purpose" including Improved Webster Vacuum and Type "R" Systems of Steam Heating.

Effective central controls for Heating Systems including Webster MODERATOR Controls ("Control-by-the-Weather") and Webster HYLO Controls.

Webster System equipment including Concealed non-ferrous Radiation, Radiator Supply Valves, Return Traps, Drip and Heavy Duty Traps, Dirt Strainers, Boiler Return Traps, Vent Traps, Boiler Protectors, Damper Regulators, Lift Fittings, Expansion Joints, Vacuum Governors, Air Separating Tanks, etc. Series "78" Traps for process pressures (10-125 lbs. per sq. in.).

Webster Systems of Steam Heating

Webster Systems of Steam Heating are complete systems of *steam circulation*. WARREN WEBSTER & COMPANY manufacture for use in these systems, the products previously listed. It should be noted, however, that the Company does not manufacture, sell or assume responsibility for combustion equipment (oil burners, stokers, etc.), boilers, piping or other equipment not of its own manufacture. These should be selected and specified by the architect in the usual way.

For suggested basic specifications for each Webster System, including all necessary items, see Webster Page 16.

A Heating System for Every Need and Purpose

Heating requirements vary so widely that no one type of heating system or no one control can be expected to provide comfort, economy and maximum investment return for all types and sizes of buildings. Realizing this, WARREN WEBSTER & COMPANY have consistently developed an entire group of Webster Systems of Steam Heating together with effective central controls—each built to meet certain conditions, each a combination of service, experience, equipment and engineering methods for the heating requirements of the individual installation.

BRANCH OFFICES

ALBANY, N. Y., 91 State Street
ATLANTA, GA., 152 Nassau Street, N. W.
ATLANTIC CITY, N. J., 529 Guarantee Trust Building
BALTIMORE, MD., 606 Garrett Building
BIRMINGHAM, ALA., 1117 Watts Building
BOSTON, MASS., 127 Federal Street
BUFFALO, N. Y., 311 Jackson Building
BUTTE, MONT., 910 So. Arizona Street
CHARLOTTE, N. C., 608 Builders Building
CHATTANOOGA, TENN., 806 James Building
CHICAGO, ILL., 549 W. Washington Street
CINCINNATI, OHIO, 704 Race Street
CLEVELAND, OHIO, 2341 Carnegie Avenue
COLUMBUS, OHIO, 539-541 Huntington Bank Building
DALLAS, TEX., 3549 Rosedale Street
DAYTON, OHIO, 1249 Union Bank Building
DENVER, COLO., 1226-1228 California Street
DES MOINES, IOWA, 1003 Hubbell Building
DETROIT, MICH., 8316 Woodward Avenue
EASTON, PA., 207 Burke Street
EL PASO, TEX., 451 First National Bank Building
GRAND RAPIDS, MICH., 1106 Sherman Street, S. E.
GREAT FALLS, MONT., 1327 Eighth Avenue, No.
HARRISBURG, PA., 305 Forster Street
HOUSTON, TEX., 910 Shell Building
INDIANAPOLIS, IND., 333 No. Pennsylvania Street
JACKSONVILLE, FLA., 212 W. Adams Street
JOHNSTOWN, PA., 7 Dibert Building
KANSAS CITY, MO., 2020 Wyandotte Street
LOS ANGELES, CAL., 320 Crocker Street
LOUISVILLE, KY., 3032 So. Preston Street
MEMPHIS, TENN., 423 Exchange Building
MILWAUKEE, WIS., 6088 Plankinton Building
MINNEAPOLIS, MINN., 87 So. Tenth Street
NEW HAVEN, CONN., 902 Chapel Street
NEW ORLEANS, LA., 824 Carondelet Street
NEW YORK, N. Y., 470 Fourth Avenue
OMAHA, NEB., 514 Baum Building
PHILADELPHIA, PA., 158 No. 20th Street
PITTSBURGH, PA., 1007 Empire Building
PORTLAND, ORE., 300 Failing Building
RALEIGH, N. C., 102 W. Hargett Street
RICHMOND, VA., 302 Carneal Building
ROANOKE, VA., 301 Liberty Trust Building
ROCHESTER, N. Y., 400 Reynolds Arcade Building
ROCK ISLAND, ILL., 1569 39th Street
N. ST. PETERSBURG, FLA., 306 Ninth Street
ST. LOUIS, MO., 2835 Washington Boulevard
SALT LAKE CITY, UTAH, 412-413 Dooly Building
SAN FRANCISCO, CAL., 420 Market Street
SEATTLE, WASH., 326 Columbia Street
SPOKANE, WASH., 822 Second Avenue
SYRACUSE, N. Y., 332 So. Warren Street
TOLEDO, OHIO, 1116 Madison Avenue
WASHINGTON, D. C., 814 Union Trust Building
WHEELING, W. VA., P. O. Box 178
WILKES-BARRE, PA., 1107 Miners Bank Building
YAKIMA, WASH., 101 W. Yakima Avenue
YORK, PA., 139 W. King Street
YOUNGSTOWN, OHIO, 451 Clearmount Drive

Consult Local Telephone Directory

WARREN WEBSTER & COMPANY

FACTORY AND MAIN OFFICE
CAMDEN, N. J.

DARLING BROTHERS, LTD., P. O. BOX 940, MONTREAL, CANADA, LICENSEES AND MANUFACTURERS

IMPROVED WEBSTER SYSTEMS OF STEAM HEATING

THE Improved Webster Systems are two-pipe systems of steam circulation *with the addition* of accurately sized metering orifices at the radiator supply connections, and, in such installations as require it, intermediate metering orifices at points in branch mains. Metering orifices, when properly selected and installed, effect even distribution of steam to all parts of the heating system and permit the successful application of a centralized control.

How Even Distribution Is Accomplished

In the older types of systems the nearest radiators become warm first while the farthest radiators do not begin to get warm until the others are filled. Now, in the Improved Webster Systems, *all radiators get steam at the same time and substantially in proportion to the need for steam.* In Fig. 2 it can be seen that the metering orifice in radiator A is quite small. When steam reaches this radiator the amount that can enter is therefore restricted. As a result the remaining steam quickly flows on through the piping to the next radiator B. Here the opening is slightly larger because the pressure of the steam by the time it reaches radiator B is lower. So it goes, radiator by radiator, to the farthest point. The "pressure drop" to each radiator has been equalized or balanced by installation of the correctly sized metering orifice. The result is that each radiator receives a proportionate amount of steam.

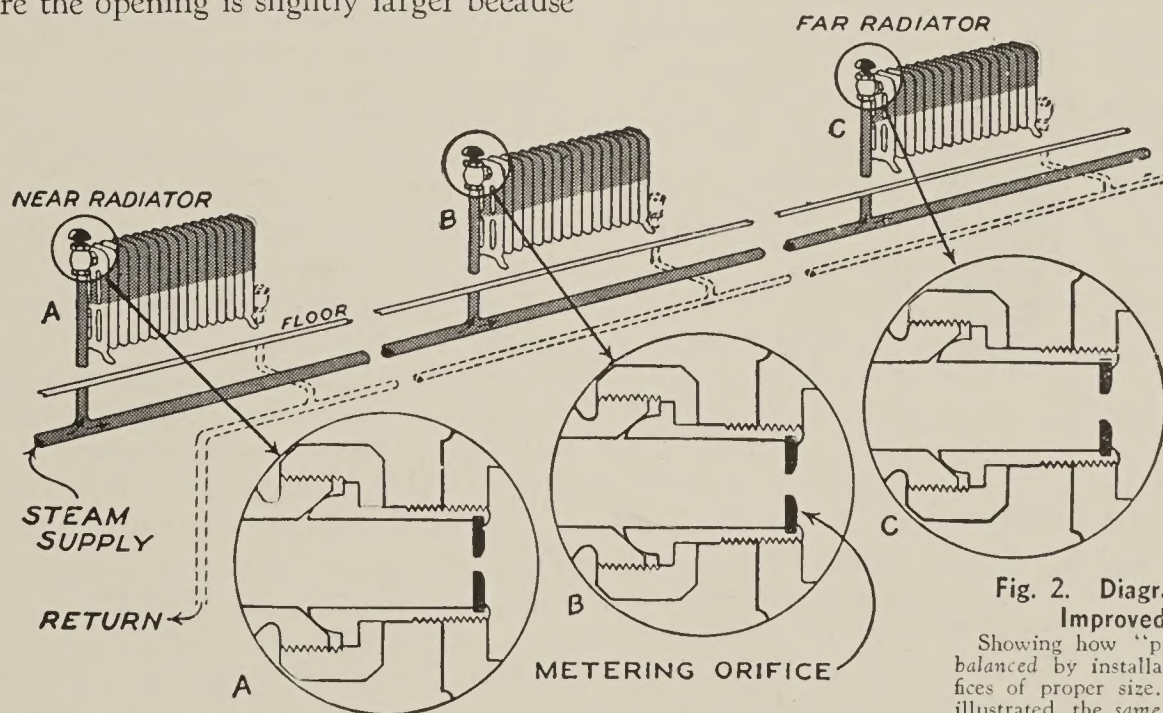


Fig. 2. Diagrammatic Sketch of the Improved Webster System

Showing how "pressure drop" is equalized or balanced by installation of standard metering orifices of proper size. While cast-iron radiation is illustrated, the same heating result is attained with convection heating units.

Improved Systems Are Controllable

Any type of control works better with the Improved Webster Systems. As a matter of fact, an Improved Webster System without any control will be worthwhile because of its solution of distribution problems. But, to assure steam consumption economy, together with maximum comfort, *control of heating system operation* is the vitally important factor. The mere installation of a so-called "key-room" thermostat to open a burner or valve does not give adequate control of operation. To start with, the system must be controllable. The Improved Webster Systems are controllable by the application of a single, central control which assures economy of steam consumption and *moderates* excesses of over-heating and under-heating.

Where definite temperature control is desired at each individual radiator, the temperature control equipment may be used in conjunction with Improved Webster Systems. Webster central controls are described on Webster pages 3 to 5 inclusive.

Flexible in Application

Improved Webster Systems are basic systems of steam circulation and use steam from boilers, engine or turbine exhaust, street lines, etc. They can be used with almost all types of direct radiation generally employed in steam heating practice.

The Improved Systems operate as vacuum, open-return or gravity systems with respect to their return line piping.

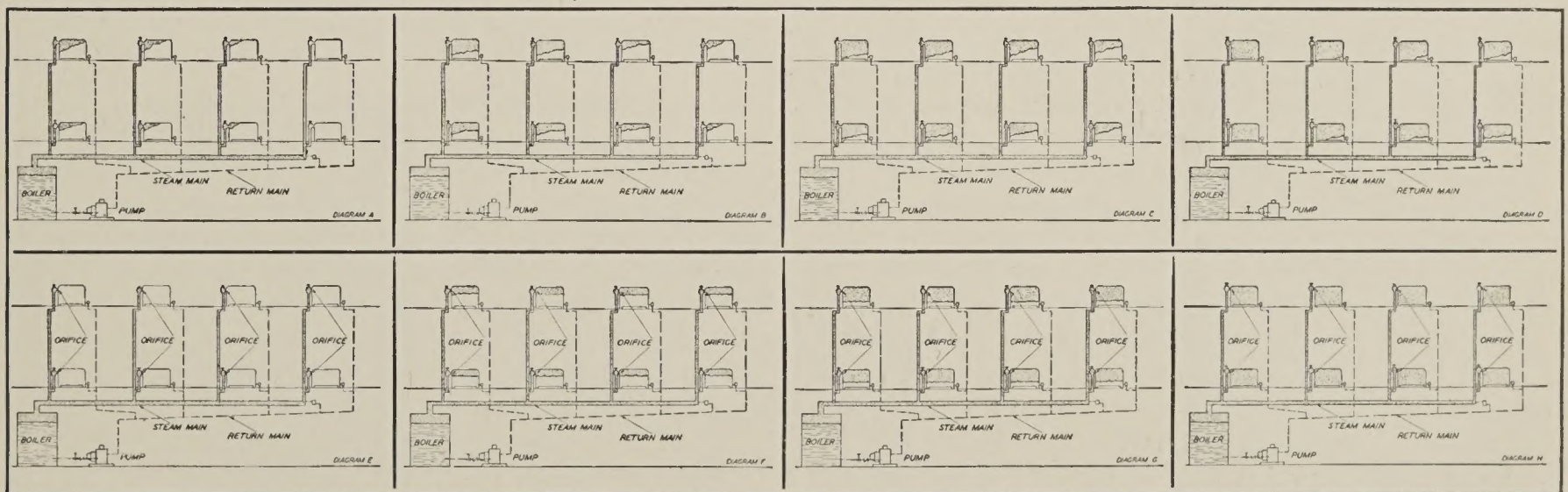


Fig. 1. Comparison of steam distribution to radiators during heating-up period in an ordinary vacuum system and an Improved Webster Vacuum System. Diagrams A to D show distribution in an ordinary system at the start of the heating-up period, two intermediate periods and full load. Diagrams E to

H show these same periods with an Improved Vacuum System using standard metering orifices. Note particularly that the supply of steam to each radiator is so equalized and balanced that all radiators get steam at the same time and in substantially the same proportion, regardless of distance from the boiler.

WEBSTER TYPE E-2 ELECTRIC MODERATOR CONTROL

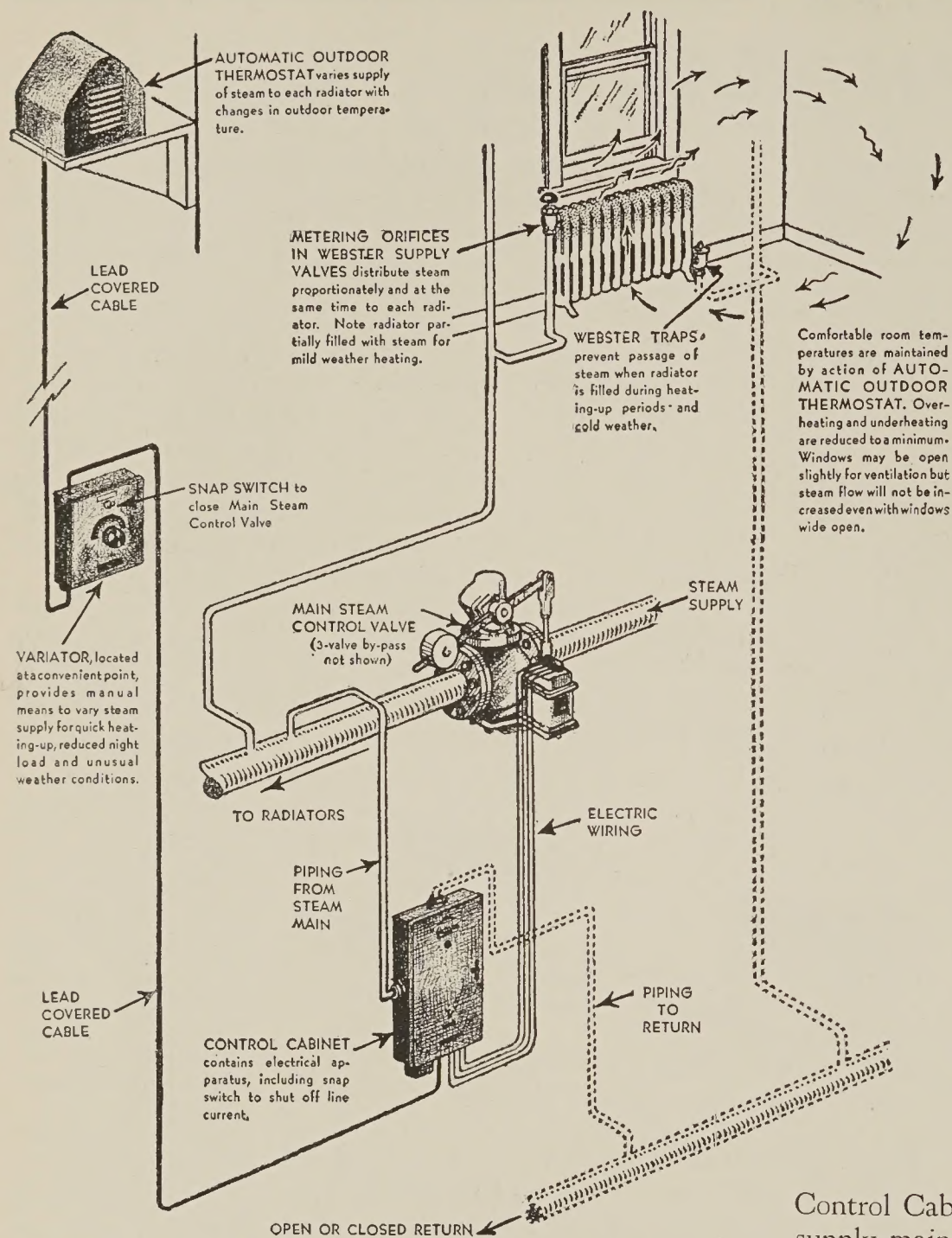


Fig. 3. Standard Arrangement of Improved Webster System with Webster Electric Moderator Control, Using a Single Main Steam Control Valve

Webster Electric Moderator Control automatically varies the amount of steam supplied to the entire heating system in accordance with outside temperature. It is provided in two general arrangements:

(1) Standard arrangement of one single Main Steam Control Valve (illustrated in Fig. 3) which is adequate for the requirements of the average building.

(2) Multiple Valve arrangement for large installations or groups of buildings, providing Moderator Control of two or more Main Steam Control Valves with each valve under control of its own Outdoor Thermostat and each valve adjustable by means of an individual Variator.

For the purpose of description the standard arrangement illustrated in Fig. 3 will be used. Steam may be delivered from high or low pressure boiler or from any other source. Return piping may be either "open" or "closed," as Webster Moderator Control always regulates the pressure difference and will function equally well regardless of whether the pressure in the return piping is at atmosphere or below.

The Main Steam Control Valve is actuated automatically by the electrical Moderator Control apparatus. The valve is motor-operated, closing when the motor turns in one

direction, and opening when the motor turns in the reverse direction.

The Moderator Control serves simply to reverse the direction of the motor, causing it to move in the closing direction when less steam is required and to move in the opening direction when more steam is required.

The electrical Outdoor Thermostat provides the automatic "Control-by-the-Weather" feature by selecting a given circuit depending on the outdoor temperature. The circuit selected at 70° F. outdoor temperature will cause the Main Steam Control Valve to close almost entirely. At the extreme of 0° F. outdoor temperature (or -10° F. or +10° F. etc., depending on climate) the circuit selected by the Outdoor Thermostat will cause the valve to open sufficiently to keep the radiators filled with steam. At intermediate outdoor temperatures, the Main Steam Valve is opened proportionately and radiators are fractionally or partially filled with steam. The circuit thus selected automatically by the Outdoor Thermostat may be advanced or retarded by the Variator to give more or less steam than is called for by the outdoor temperature.

Compensation for Pressure Changes

Fluctuations in boiler pressure, in vacuum, in number of radiators turned on, etc., change the pressure difference in the heating system from that called for by the joint action of Outdoor Thermostat and Variator. These changes in pressure difference are compensated for automatically by means of a pressure-actuated mercury contact tube in the Control Cabinet. One end of this tube is connected to the supply main and the other end to the return. If, for example, the supply pressure is unduly increased, mercury rises in the tube, an electrical circuit is made and the Main Steam Valve begins to close. Then, the pressure difference decreases to that called for by the Control equipment, the mercury drops in the tube, the circuit is broken and the valve is again under the influence of the Control equipment. A reverse action takes place when the pressure difference falls below that called for by the Control equipment.

Multiple Valve Moderator Installations

For all installations of average size where occupancy conditions are uniform throughout the building, the single valve arrangement will be preferred because of lower first cost. For large installations, particularly where occupancy conditions vary in different portions of the building or in different buildings in a group, the multiple valve arrangement may be chosen. When two or more Main Steam Valves are employed, each valve is provided with its own Outdoor Thermostat, Control Cabinet and Variator.

Use of the multiple valve arrangement gives in addition to the advantages of Moderator Control (1) modification of heat delivery to any single zone by means of the Variator (thus in a two zone installation the more exposed zone may be favored by additional heat over the less exposed side) and (2) manual shut-off of steam to any single zone by use of the remote control switch on its Variator.

WEBSTER ELECTRIC MODERATOR CONTROL EQUIPMENT

Automatic Outdoor Thermostat

Provides automatic "Control-by-the-Weather." It is simple, rugged and compact. Housing is a strong iron casting

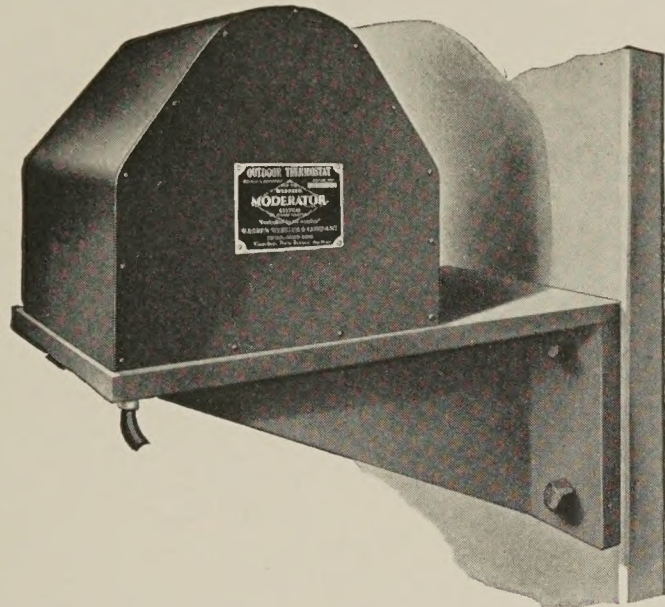


Fig. 4. Automatic Outdoor Thermostat Is 9x9x7 In. in Size

with weatherproof steel cover plates. Thermostatic element is a bimetallic coil which expands with increases in temperature and contracts as temperature lowers. This expansion and contraction moves a roller arm over silver contact wires on a bakelite plate, each wire forming a separate electrical circuit to energize the motor which proportionately moves the Main Steam Control Valve from open to shut position. The last circuit can be arranged to close the main valve when the outdoor temperature reaches 65° F. or 70° F., or to hold it at a minimum open position with a small amount of steam always passing into the heating system.

Installation—Placed on post or bracket on roof or outside wall (bracket not included). A multi-wire lead covered cable (Graybar No. 141-B or equal) leads into the Thermostat from the Variator and connections are made to terminal posts on a bakelite plate. These connections are completely sealed from the weather. Approx. wt. of Thermostat 35 lbs.

Variator

A small metal cabinet containing (1) adjustable knob for manual control of the steam supply and (2) snap switch to close Main Steam Control Valve.

Operation—Modifies action of Outdoor Thermostat. Turning knob to left reduces steam supply; turning right increases supply. Used principally for heating-up during early morning hours and for reduced evening or night heating. Occasionally for exceptional weather conditions such as winds, hot sun, cloudiness, etc. However "normal" setting will take care of average conditions of wind, sun and shade.

Installation—Can be located on wall at any convenient operating station—the boiler room, superintendent's office, beside private telephone exchange, etc. Adjustment is simple and may be made by stenographer

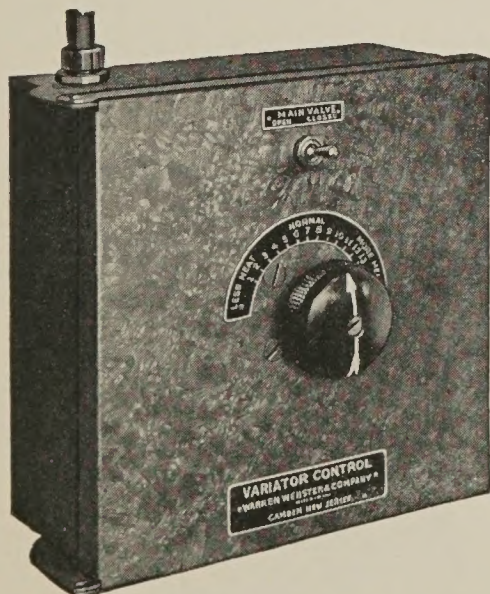


Fig. 5. The Variator Is 11x11x6 In. in Size

or telephone operator. Is connected by lead covered cable to both Outdoor Thermostat and Control Cabinet. Approx. wt. 15 lbs.

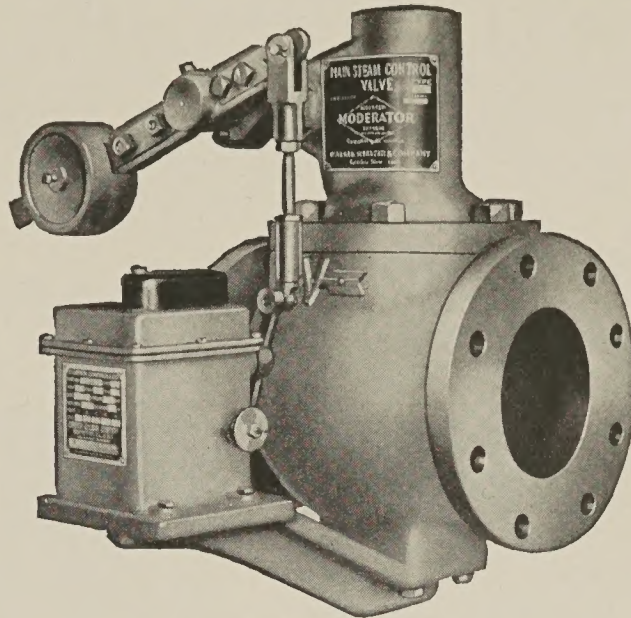


Fig. 6. Main Steam Control Valve

Main Steam Control Valve

Semi-balanced piston type with V-ports. Furnished in standard pipe sizes from 2 to 12 in. inclusive. Bodies are cast iron and internal parts bronze. With exception of 2 and 2½ in. sizes with screwed bodies all valves have flanged bodies. Companion flanges not included. Standard induction type, adjustable speed reversing motor opens and closes the valve through lever linkage. Rising valve stem moves freely without any stuffing box, packing being confined to slowly rotating horizontal shaft at top.

Installation—Installed in steam main using conventional 3-valve by-pass. One-valve by-pass may be used where considered adequate. Wired to cabinet by four No. 14 wires.

Control Cabinet

Contains standard electrical apparatus such as transformers, relays, fuses, etc., in addition to specially designed mercury contact tube. Has hinged cover for accessibility. On outside of cover is green pilot light to show when control mechanism is in circuit. Also a snap switch for shut-off of line current.

Installation—Bolted or screwed to wall near Main Steam Control Valve. Connected to Variator by lead covered cable; to Main Control Valve by four No. 14 wires. Line current (150 watts, 110 volts a.c.) to operate entire control system is brought to this cabinet. For d.c. current, a Rotary Converter should be provided. Piping connections for compensation of pressure changes made from cabinet to steam and return mains. Approx. wt. 80 lbs.

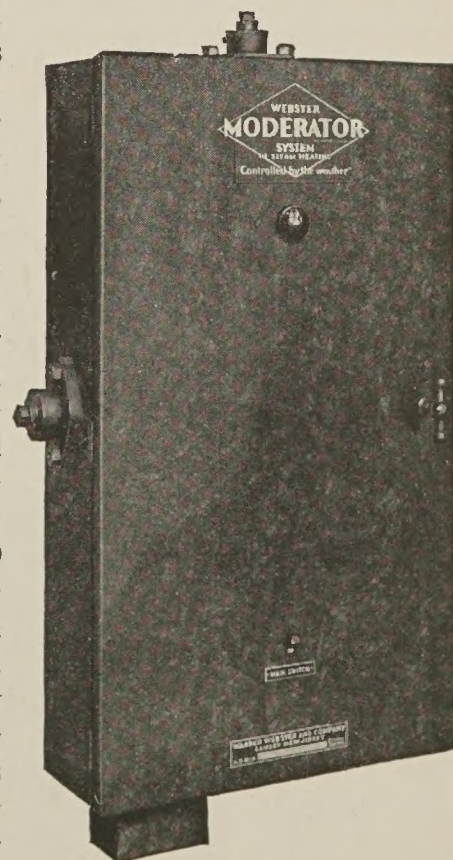


Fig. 7. Control Cabinet Is 16x28x6 In. in Size

OTHER WEBSTER CENTRAL CONTROLS

Webster Electric Hylo Control

A manual central control especially applicable to two-pipe orifice systems using "street" steam. Steam is supplied to each radiator in short "puffs" of varying length. Length of "puff" is determined by setting of knob on Controller according to outdoor temperature. A rotating cam in cabinet opens and closes Main Control Valve in steam main. Provides continuous heating effect (no intermittent heat or "cold 70") with a low cost central control for small and medium sized buildings.

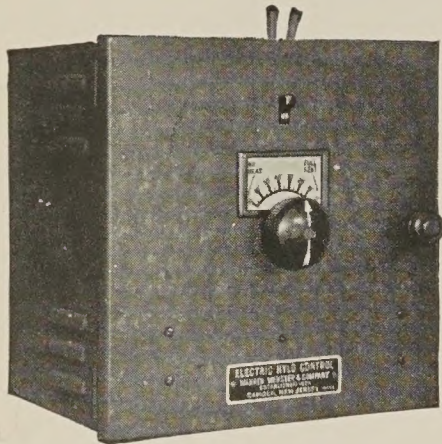


Fig. 8. (At Left) Electric Hylo Controller

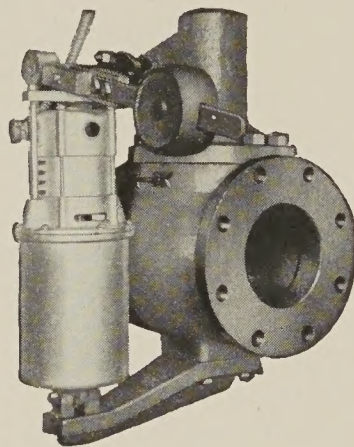


Fig. 9. (At Right) Type "F" Valve for Electric Hylo Control

Webster Hylo Steam Variator Control

A manual central control of the graduated, continuous flow type to vary steam supply to entire system according to changes in outdoor temperature. Provides a simple, rugged and dependable control for the smaller building. Consists of Hylo Steam Variator (Fig. 10) and Type "E" Main Steam Control Valve described on page 4 and Fig. 6. Position of weights on beam scales causes motor to proportionately open or close Type "E" Valve in steam main. Ordinary variations in supply and return mains are compensated for automatically. Can be furnished with indoor thermostat for automatic overheat limit control and clock for automatic shut-off. Remote Shut-off Switch for Main Valve can also be furnished. Applicable to two-pipe orificed systems using low pressure steam from any source. Under certain conditions, Webster Type "E" Valve may be omitted and Variator wired to directly control Stoker Motors. Write for details.

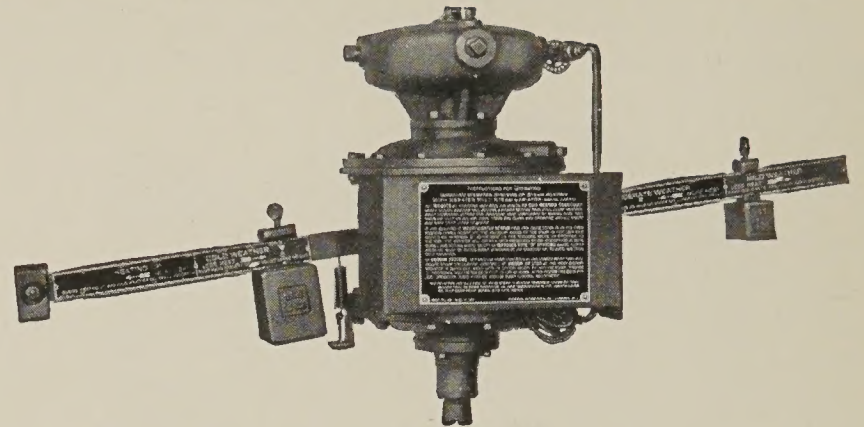


Fig. 10. The Webster Hylo Steam Variator

Note adjustable weights. Scale on beam is clearly marked reading from left to right "HEATING UP," "COLD WEATHER," "MODERATE WEATHER," and "MILD WEATHER," making adjustment simple and understandable by unskilled operators.

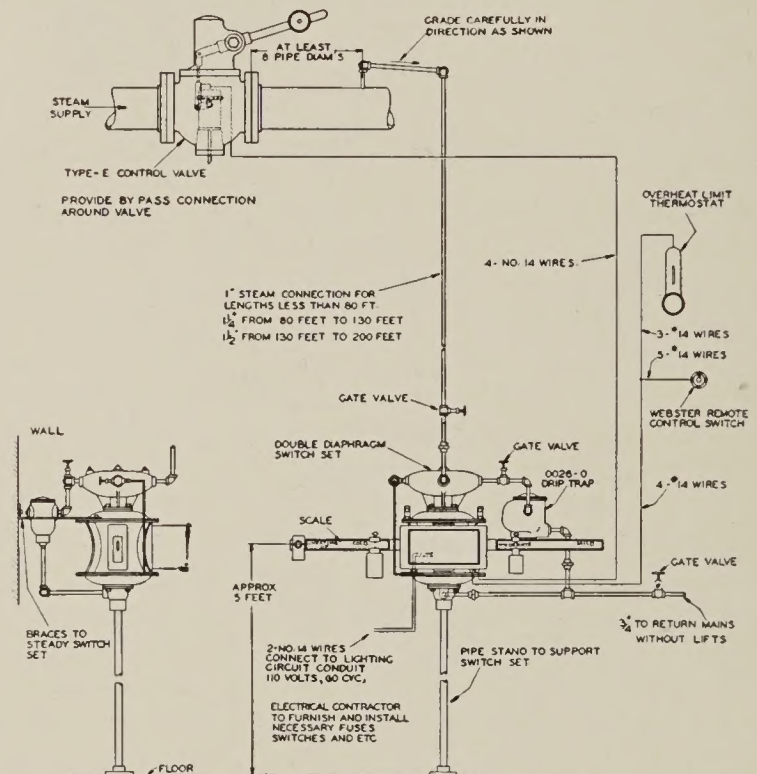


Fig. 11. General Arrangement of Webster Hylo Steam Variator with Remote Shut-off Switch and Overheat Limit Thermostat

Webster Pneumatic-Type Moderator Control

Pneumatic-type Moderator Control, automatically varies the amount of steam supplied to the entire heating system in accordance with outside temperature. Results in comfort and economy are the same as with Electric Moderator Control. Uses automatic Roof Thermostat (Fig. 13) for "Control-by-the-Weather." A Variator (Fig. 12) provides supplementary manual control for heating-up, reduced night loads and unusual weather conditions. An air compressor is furnished where compressed air supply is not already available at the building. Main Steam Control Valve is Type "E" (described on Webster page 4 and in Fig. 6) motor of which is energized

by three-diaphragm Switch Set (Fig. 14) to proportionately open or close Main Control Valve. Pressure fluctuations in supply and return mains are compensated for automatically by the Switch Set. Applicable to large buildings, particularly zoned buildings or groups of buildings using two or more Main Control Valves operated by a single Roof Thermostat and Variator.



Fig. 12. The Variator



Fig. 13. Roof Thermostat

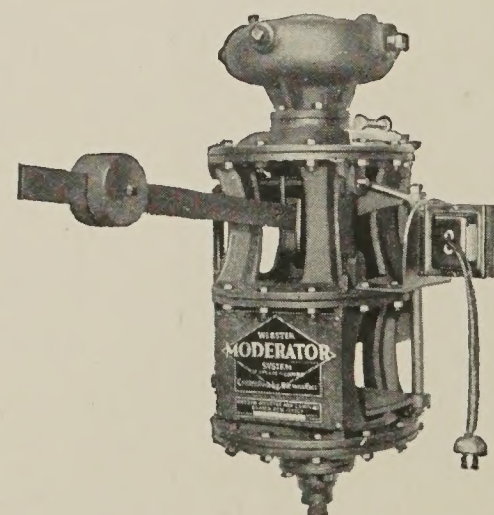


Fig. 14. Switch Set

WEBSTER SYSTEM EQUIPMENT

Used as needed in Webster Systems of Steam Heating and includes the following:

Webster "Three-Point" Radiator Valve

Designed for Improved Webster Systems where orifices are used to obtain correct steam distribution. Includes a sleeve orifice fitting into the seat opening and easily changed if radiation or occupancy changes require a new orifice size. Valve is normally an *open-shut* type but may be converted to *shut, normal and excess* type. The excess position gives 140% of normal steam requirements. Especially desirable for hospitals, hotels, etc., where quick heating-up or higher temperature are desired in different rooms. Usually shipped as standard *open-shut* valves. The "Three-Point" feature is quickly obtained by reversing dial plate. With exception of disc and handle, all essential parts are of high grade steam brass. Outside nicked with attractive satin finish. Standard bakelite wheel handles.

Made in angle, right-corner, left-corner and straightway models with either standard wheel, lever or lockshield handles. Sizes $\frac{3}{4}$ and 1 in.

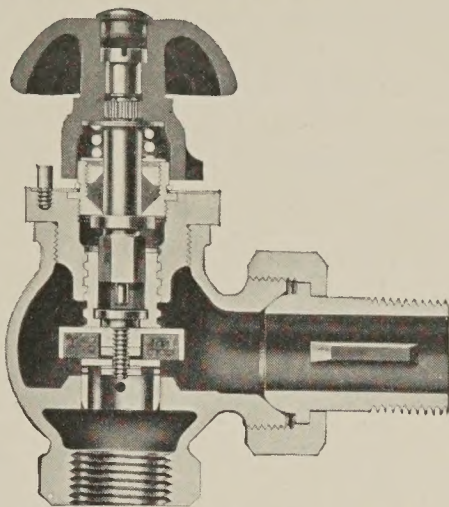


Fig. 15. Webster "Three-Point" Valve

Webster Type "W" Radiator Valve

A standard supply valve of highest quality both in design and construction. Slotted seat sleeve gives "modulation" of steam flow provided proper pressure is maintained on system.

Essential parts except disc and handle are of high grade steam brass. Outside nicked with attractive satin finish. Standard bakelite wheel handles. Made in angle, right-corner, left-corner, straightway single-union and straightway double-union models with either wheel, lever, lockshield, chain wheel or extension stem handles. Sizes $\frac{1}{2}$, $\frac{3}{4}$, 1 and $1\frac{1}{4}$ in.

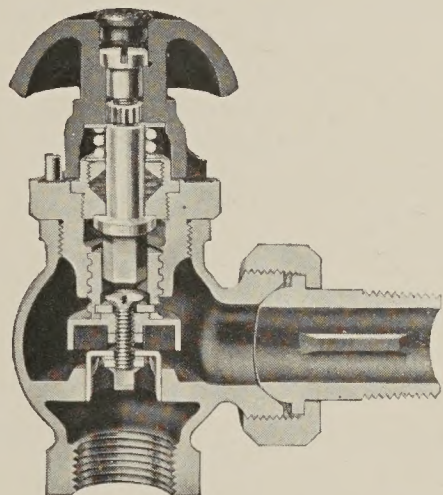
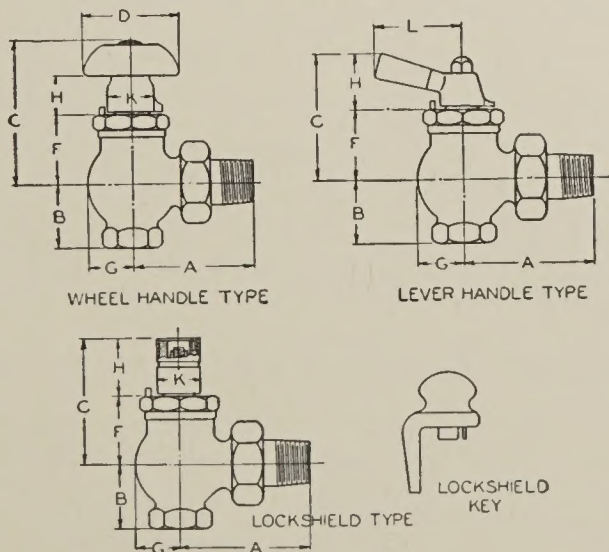


Fig. 16. Webster Type "W" Valve

TABLE I. Dimensions of Webster Type "W" and "Three-Point" Valves

Angle Body with Wheel (Standard), Lever, and Lockshield Handles

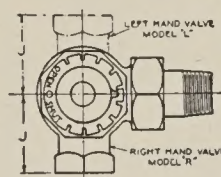


Size	All types				Wheel handle			
	A	B	F	G	C	D	H	K
$\frac{1}{2}$ "	$2\frac{13}{16}$	$1\frac{1}{4}$	$1\frac{1}{2}$	1	$3\frac{3}{16}$	$2\frac{1}{4}$	$1\frac{5}{16}$	$1\frac{3}{16}$
$\frac{3}{4}$ "	$2\frac{15}{16}$	$1\frac{1}{2}$	$1\frac{11}{16}$	$1\frac{1}{8}$	$3\frac{7}{16}$	$2\frac{1}{4}$	$1\frac{5}{16}$	$1\frac{3}{16}$
1"	$3\frac{3}{16}$	$1\frac{3}{4}$	$1\frac{7}{8}$	$1\frac{5}{16}$	$4\frac{3}{16}$	3	$1\frac{1}{4}$	$1\frac{5}{16}$
$1\frac{1}{4}$ "	$3\frac{9}{16}$	2	$2\frac{1}{8}$	$1\frac{1}{2}$	$4\frac{7}{16}$	3	$1\frac{1}{4}$	$1\frac{5}{16}$

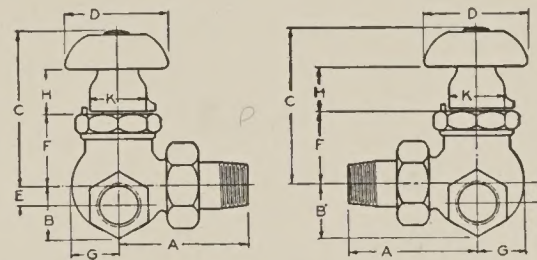
Size	Lever handle			Lockshield		
	C	H	L	C	H	K
$\frac{1}{2}$ "	3	$1\frac{1}{2}$	$2\frac{3}{16}$	$2\frac{7}{8}$	$1\frac{7}{16}$	1
$\frac{3}{4}$ "	$3\frac{3}{16}$	$1\frac{1}{2}$	$2\frac{3}{16}$	$3\frac{1}{16}$	$1\frac{7}{16}$	1
1"	$3\frac{3}{4}$	$1\frac{7}{8}$	$2\frac{5}{16}$	$3\frac{11}{16}$	$1\frac{13}{16}$	$1\frac{1}{8}$
$1\frac{1}{4}$ "	4	$1\frac{7}{8}$	$2\frac{5}{16}$	$3\frac{15}{16}$	$1\frac{13}{16}$	$1\frac{1}{8}$

All dimensions in inches and subject to slight variation.

TABLE II. Dimensions of Webster Type "W" and "Three-Point" Valves



Right-corner and Left-corner Bodies with Wheel Handle
See Table I for dimensions of lever and lockshield handles.



Size	A	B	C	D	E	F	G	H	J	K
$\frac{1}{2}$ "	$2\frac{13}{16}$	$1\frac{1}{8}$	$3\frac{7}{16}$	$2\frac{1}{4}$	$\frac{3}{8}$	$1\frac{5}{8}$	1	$1\frac{5}{16}$	$1\frac{1}{2}$	$1\frac{3}{16}$
$\frac{3}{4}$ "	$2\frac{15}{16}$	$1\frac{1}{4}$	$3\frac{9}{16}$	$2\frac{1}{4}$	$\frac{7}{16}$	$1\frac{11}{16}$	$1\frac{1}{8}$	$1\frac{5}{16}$	$1\frac{5}{8}$	$1\frac{3}{16}$
1"	$3\frac{3}{16}$	$1\frac{1}{2}$	$4\frac{3}{8}$	3	$1\frac{1}{2}$	$2\frac{1}{16}$	$1\frac{5}{16}$	$1\frac{1}{4}$	2	$1\frac{5}{16}$

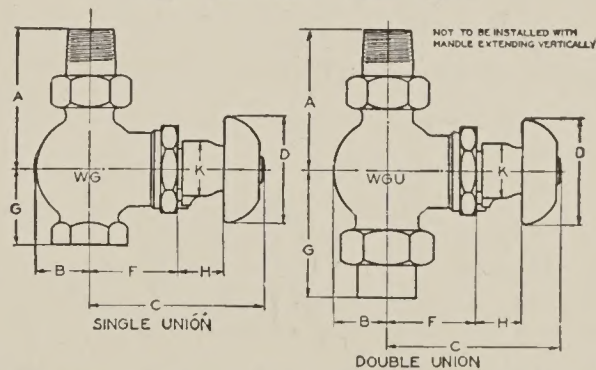
All dimensions in inches and subject to slight variation.

TABLE III. Dimensions of Webster Type "W" and "Three-Point" Valves

Straightway Bodies with Wheel Handles

See Table I for dimensions of lever and lockshield handles.

Single and Double Union Types



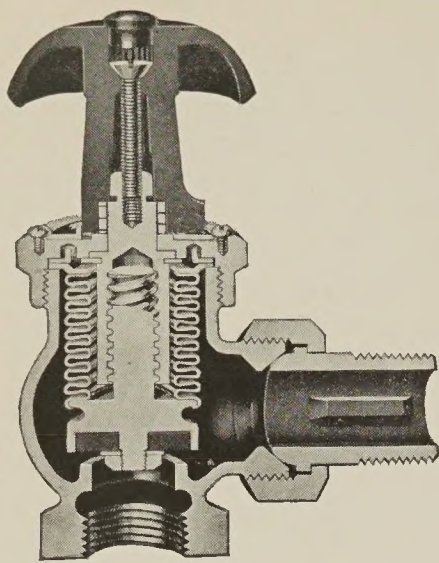
To be installed as shown above with bodies in vertical position

Size	A	B	C	D	F	G	H	K
Single Union								
$\frac{1}{2}$ "	$2\frac{7}{8}$	$1\frac{5}{16}$	$3\frac{9}{16}$	$2\frac{1}{4}$	$1\frac{3}{4}$	$1\frac{1}{2}$	$1\frac{5}{16}$	$1\frac{3}{16}$
$\frac{3}{4}$ "	3	$1\frac{1}{16}$	$3\frac{11}{16}$	$2\frac{1}{4}$	$1\frac{7}{8}$	$1\frac{5}{8}$	$1\frac{5}{16}$	$1\frac{3}{16}$
1"	$3\frac{1}{8}$	$1\frac{5}{16}$	$4\frac{1}{2}$	3	$2\frac{3}{16}$	2	$1\frac{1}{4}$	$1\frac{5}{16}$
Double Union								
$\frac{3}{4}$ "	3	$1\frac{1}{16}$	$3\frac{11}{16}$	$2\frac{1}{4}$	$1\frac{7}{8}$	$2\frac{11}{16}$	$1\frac{5}{16}$	$1\frac{3}{16}$
1"	$3\frac{1}{8}$	$1\frac{5}{16}$	$4\frac{5}{8}$	3	$2\frac{3}{16}$	$2\frac{7}{8}$	$1\frac{1}{4}$	$1\frac{5}{16}$

All dimensions in inches and subject to slight variation.

Webster Syphon Packless Radiator Valve

Quick-opening positively packless, having flexible laminated Syphon bellows completely enclosing stem. Body of

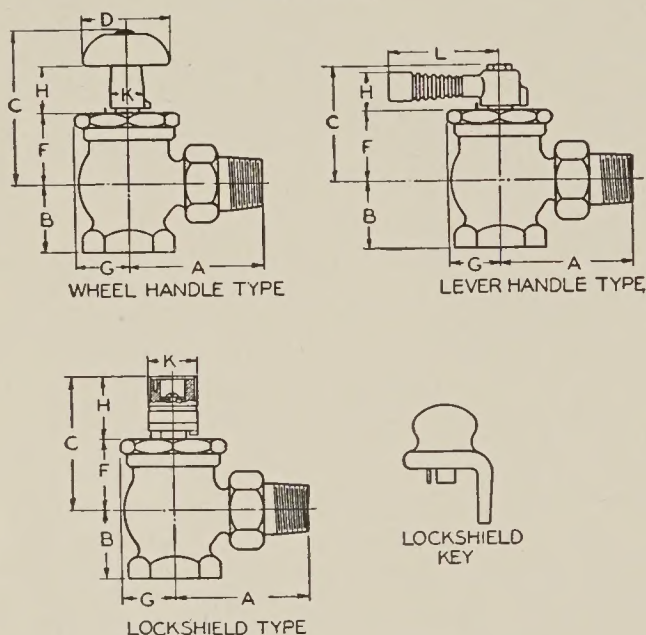


steam brass, composition disc, bakelite handle. Made in 1/2, 3/4, 1, 1 1/4, 1 1/2 and 2-in. sizes; in angle, right-corner, left-corner and straightway single-union models with lever, wheel, lockshield, chain wheel or extension stem handles.

At Left:

Fig. 17. Webster Sylphon Packless Valve

TABLE IV. Dimensions of Webster Sylphon Packless Valves Angle Body with Wheel (Standard), Lever, and Lockshield Handles

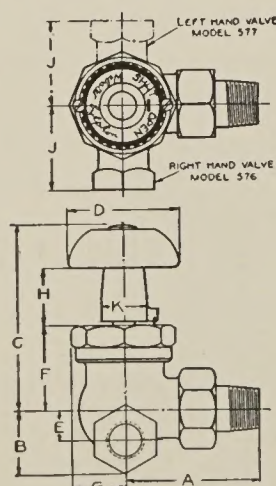


Size	All types				Wheel handle			
	A	B	F	G	C	D	H	K
1/2"	2 5/8	1 1/4	1 5/16	1	3 1/2	2 1/8	1 1/8	7/8
3/4"	2 3/4	1 3/8	1 5/8	1	3 9/16	2 1/8	1 1/8	7/8
1"	3 1/8	1 3/4	2 1/8	1 5/16	4 5/16	2 5/8	1 3/8	7/8
1 1/4"	3 5/8	1 7/8	2 1/8	1 5/16	4 5/16	2 5/8	1 3/8	7/8
1 1/2"	3 7/8	2 3/16	2 5/16	1 1/2	4 7/8	3	1 1/2	7/8
2"	4 3/8	2 7/16	2 5/16	1 1/2	4 7/8	3	1 1/2	7/8

Size	Lever handle			Lockshield		
	C	H	L	C	H	K
1/2"	2 9/16	1 3/16	2 1/8	2 13/16	1 1/4	1 5/16
3/4"	2 11/16	1 3/16	2 1/8	2 7/8	1 1/4	1 5/16
1"	3 3/16	1 3/16	2 1/8	3 3/8	1 1/4	1 5/16
1 1/4"	3 3/16	1 3/16	2 1/8	3 3/8	1 1/4	1 5/16
1 1/2"	3 3/8	1 3/16	2 5/8	3 9/16	1 1/4	1 5/16
2"	3 3/8	1 3/16	2 5/8	3 9/16	1 1/4	1 5/16

All dimensions in inches and subject to slight variation.

TABLE V. Dimensions of Webster Sylphon Packless Valves



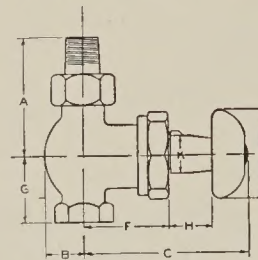
Right-corner and Left-corner with Wheel Handles

See Table IV for dimensions of lever and lockshield handles.

Size	A	B	C	D	E	F	G	H	J	K
1/2"	2 5/8	1 1/4	3 9/16	2 1/8	9/16	1 5/8	1	1 1/8	1 5/8	7/8
3/4"	2 3/4	1 3/8	3 5/8	2 1/8	1 1/16	1 11/16	1	1 1/8	1 3/4	7/8
1"	3 1/8	2	4 3/8	2 5/8	1 1/16	2 3/16	1 5/16	1 3/16	2 1/16	7/8

All dimensions in inches and subject to slight variation.

TABLE VI. Dimensions of Webster Sylphon Packless Valves Straightway Bodies with Wheel Handles



See Table IV for dimensions of lever and lockshield handles.

Single Union Type

To be installed only as shown here with body in vertical position

Size	A	B	C	D	F	G	H	K
1/2"	2 13/16	7/8	3 7/8	2 1/8	1 15/16	1 9/16	1 1/8	7/8
3/4"	2 7/8	1	4 1/16	2 1/8	2 1/8	1 3/4	1 1/8	7/8
1"	3 9/16	1 1/4	5 1/8	2 5/8	2 15/16	2 1/4	1 3/8	7/8

All dimensions in inches and subject to slight variation.

Webster Type "B" Radiator Valve

Simple in design and of good quality. Quick-opening, non-rising stem type. Screwed gland takes up wear of molded ring packing. Steam brass body with forged brass cap. Union nipple is made from brass bar stock and has over-sized lugs for strength. Union nut is a brass forging. Composition disc is renewable.

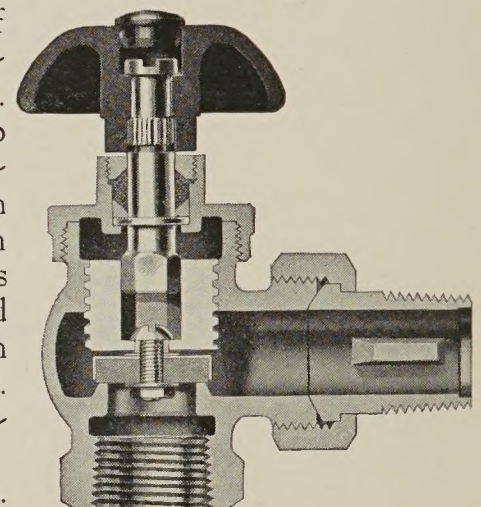
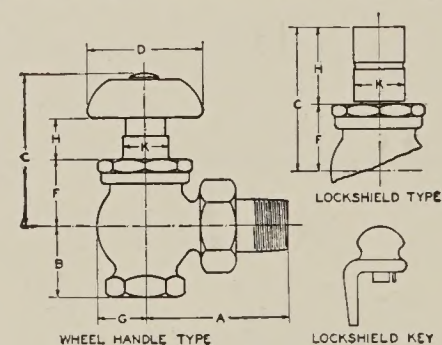


Fig. 18. Webster Type "B" Radiator Valve

Made in 1/2, 3/4 and 1 in. sizes with angle, left-corner, right-corner, and straightway single-union and double-union body models. Bakelite wheel handle. Lockshield, chain wheel and extended stem handles also available.

TABLE VII. Dimensions of Webster Type "B" Valves

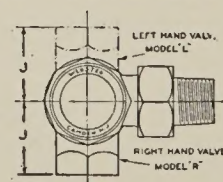
Angle Body with Wheel (Standard) and Lockshield Handles



Size	Wheel handle								Lockshield		
	A	B	C	D	F	G	H	K	C	H	K
$\frac{1}{2}$ "	$2\frac{3}{4}$	$1\frac{3}{8}$	3	$2\frac{1}{4}$	$1\frac{5}{16}$	$1\frac{5}{16}$	$1\frac{3}{16}$	$\frac{7}{8}$	$2\frac{11}{16}$	$1\frac{3}{8}$	1
$\frac{3}{4}$ "	$2\frac{3}{4}$	$1\frac{3}{8}$	3	$2\frac{1}{4}$	$1\frac{5}{16}$	$1\frac{5}{16}$	$1\frac{3}{16}$	$\frac{7}{8}$	$2\frac{11}{16}$	$1\frac{3}{8}$	1
1"	$3\frac{1}{8}$	$1\frac{3}{8}$	$3\frac{1}{4}$	$2\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{11}{16}$	$\frac{7}{8}$	$\frac{7}{8}$	$2\frac{7}{8}$	$1\frac{3}{8}$	$1\frac{1}{8}$

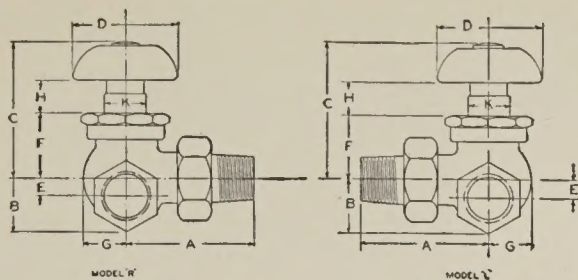
All dimensions in inches and subject to slight variation.

TABLE VIII. Dimensions of Webster Type "B" Valves



Right-corner and Left-corner Bodies with Standard Wheel Handle
See Table VII for dimensions of lockshield handle.

WARREN WEBSTER & COMPANY



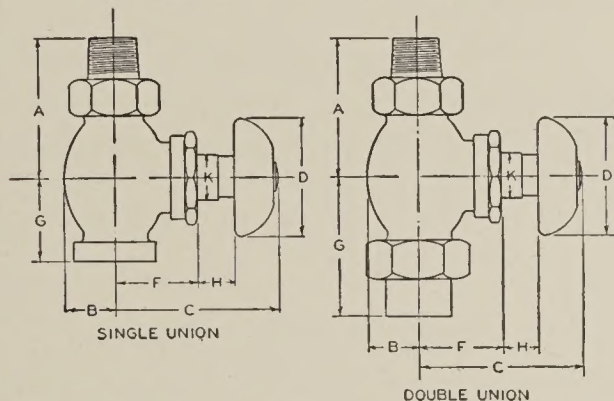
Size		A	B	C	D	E	F	G	H	J	K
Inlet	Outlet										
3/4"	1/2"	2 3/4	1 3/16	3	2 1/4	3/8	1 5/16	1 5/16	1 3/16	1 9/16	7/8
3/4"	3/4"	2 3/4	1 3/16	3	2 1/4	3/8	1 5/16	1 5/16	1 3/16	1 9/16	7/8

All dimensions in inches and subject to slight variation.

TABLE IX. Dimensions of Webster Type "B" Valves
Straightway Bodies with Standard Wheel Handle

See Table VII for dimensions of lockshield handle.

Single and Double Union Types



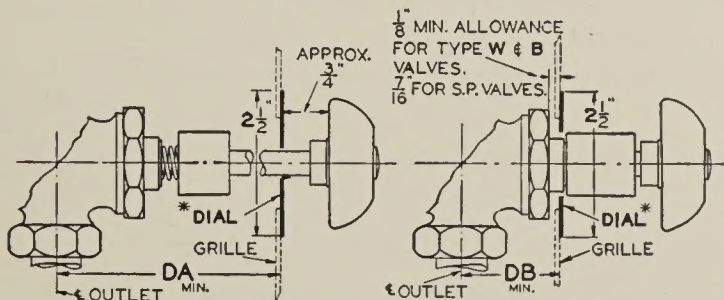
To be installed only as shown above with bodies in vertical position

Size		A	B	C	D	F	G	H	K
Inlet	Outlet								
Single Union									
3/4"	1/2"	3	1	3 1/4	2 1/4	1 9/16	1 5/8	1 3/16	7/8
3/4"	3/4"	3	1	3 1/4	2 1/4	1 9/16	1 5/8	1 3/16	7/8
1"	1"	3 1/4	1 1/8	3 3/8	2 1/4	1 5/8	1 7/8	7/8	7/8

Size		A	B	C	D	F	G	H	K
Inlet	Outlet								
Double Union									
3/4"	1/2"	3	1	3 1/4	2 1/4	1 9/16	2 11/16	1 3/16	7/8
3/4"	3/4"	3	1	3 1/4	2 1/4	1 9/16	2 11/16	1 3/16	7/8
1"	1"	3 1/4	1 1/8	3 3/8	2 1/4	1 5/8	2 13/16	7/8	7/8

All dimensions in inches and subject to slight variation.

TABLE X. Dimensions of Special Long Stem Handles for All Types of Webster Supply Valves



*STANDARD DIAL has plain satin finish without marking. Special graduated dial made up on order at extra cost.

Size	Minimum Distance for DA			Minimum Distance for DB		
	Model (see below)			Model (see below)		
	H	G & GU	R & L	H	G & GU	R & L
"W" and "Three-Point" Valves						
1/2"	3 3/8	3 7/8	3 5/8	1 5/8	1 7/8	1 3/4
3/4"	3 3/8	3 7/8	3 5/8	1 5/8	2	1 11/16
1"	3 1/2	4 1/8	4	2	2 1/8	2 3/8
1 1/4"	4 1/8	...	...	2 1/4	...	...
"B" Valve						
1/2" & 3/4"	2 1/8	3 1/8	2 1/8	1 7/8	1 11/16	1 7/8
1"	3	3 1/8	...	1 5/8	1 1/4	...

Sylphon Packless Valve

1/2"	2 7/8	3 1/4	2 1/8	2	2 3/8	2 1/8
3/4"	2 1/8	3 7/8	3	2 1/8	2 3/8	2 1/8
1"	3 1/8	4 1/4	3 1/2	2 3/8	3 3/8	2 5/8
1 1/4"	3 7/8	...	...	2 3/8	...	...
1 1/2"	3 5/8	...	...	2 3/4	...	...
2"	3 5/8	...	...	2 3/4	...	...

All dimensions in inches and subject to slight variation.
†On 1-in. Type W Valves, Model GU, the minimum DA is 4 1/2-in. and the minimum DB is 2 7/8-in.
Model H is angle body; Model G is straightway single union; Model GU straightway double union; Model R is right-corner; Model L is left-corner.

Ratings of Valves for Standard Webster Systems (Not Orificed)

The ratings given in Table XI, following, apply to all Type "W," Type "B," Sylphon Packless and Double Service Valves when used *without* orifices in Standard Webster Systems.

TABLE XI. Ratings of Unorificed Webster Supply Valves in Sq. Ft. E.D.R.

Valve size, in.	Residences, small buildings, Type "R" system	Large buildings, schools, apartments, factories, Type "R" or Vacuum System
	Pres. diff.—4 oz.	Press. diff.—8 oz.
1/2"	35 sq. ft.	50 sq. ft.
3/4"	80 sq. ft.	110 sq. ft.
1"	130 sq. ft.	185 sq. ft.
1 1/4"	225 sq. ft.	315 sq. ft.
1 1/2"	320 sq. ft.	450 sq. ft.

Selection of Valves for Improved Webster Systems (Orificed)

The schedule of valve sizes given in Table XII, following, apply to all Type "W," "Three-Point," Type "B," Sylphon Packless and Double Service Valves when used with orifices in Improved Webster Systems.

TABLE XII. Ratings of Orificed Webster Supply Valves in Sq. Ft. E.D.R.

Valve size, in.	A—Standard	B—Optional
	Sq. ft. E. D. R.	Sq. ft. E. D. R.
1/2"	0-50	0-35
3/4"	Above 50-110	Above 35-80
1"	Above 110-185	Above 80-130
1 1/4"	Above 185-315	Above 130-225
1 1/2"	Above 315-450	Above 225-320

Direct Radiators—With Improved Systems, the supply valves of radiators are provided with an orifice in either (1) the nipple of valve or (2) the valve sleeve, as in the "Three-Point" Valve. Valves should be selected of such size that practically no pressure drop occurs through the valve itself. Steam delivery then depends upon the size of the orifice and the pressure difference across it. The suggested sizes in Table XII-A can be used for most installations.

There may be applications where it is desirable to have valve sizes larger. Occasionally a larger valve may be preferred for appearance. In such cases, Table XII-B may be used.

Pressures—Webster Radiator Valves are for use with low pressure Webster Systems of Steam Heating where boiler pressures do not generally exceed 2 lbs. per sq. in. However, Webster Valves will not be detrimentally affected by occasional pressures up to 10 lbs. per sq. in.

Webster Metering Orifices

These are discs built into radiator valve nipples, each with a restricted opening, the size of which is determined by the amount of radiation, the distance (equivalent pipe length) of the radiator from the source of supply and, in tall buildings, the effect of altitude. The size of orifices to be installed at each radiator is se-

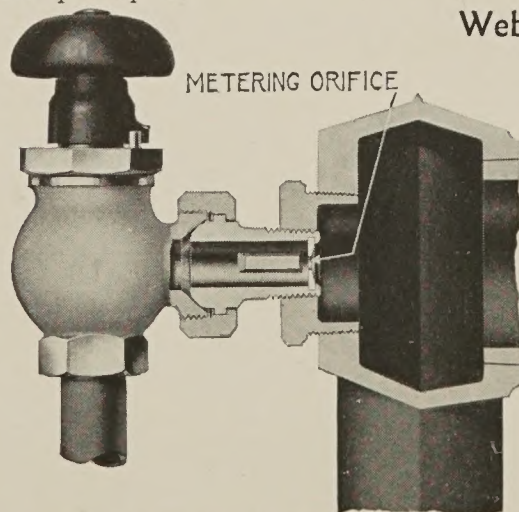


Fig. 19. Metering Orifice in Nipple of a Webster Supply Valve

lected by the engineers of the nearest Webster branch office, who are equipped with complete data to make possible a proper selection. Webster Metering Orifices should not be confused with "regulating plates," "adjustable modulating valves" and similar means for obtaining rough approximate "balance."

The discs are of heavy gauge Monel Metal to resist erosion and corrosion, amply thick to be free from vibration and shaped for silent operation. Nipples with the discs securely inserted are carried in stock in a wide range of standard sizes to fit all types of Webster Supply Valves. For existing installations using earlier types of Webster Valves and for all valves of other make these Orifices may be obtained on order made up in special nipples and other forms to meet conditions and permit low cost modernization.

Intermediate Metering Orifices

Provided for installation in branch mains to assist in primary distribution. Made of brass plate and provided with two attached copper asbestos gaskets and suitable lugs for mounting in pipe lines between union flanges and between companion flange and gate valve. They are supplied on special order in standard pipe sizes commonly used in heating systems.

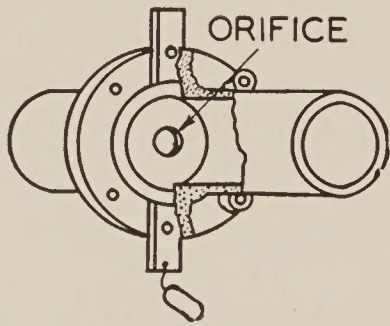


Fig. 20

Intermediate Orifice in Branch Main Union Flanges. Pipe and Flange are broken away to show Orifice

Webster Double Service Valve

Combines a thermostatic trap with a quick-opening valve. Simplifies piping connections in down-feed risers as used in one-story buildings. Acts as trap for draining down-feed riser and as a radiator supply valve. Metering orifices can be furnished for Double Service Valve when used with Improved Webster Systems. For Ratings see Tables XI and XII.

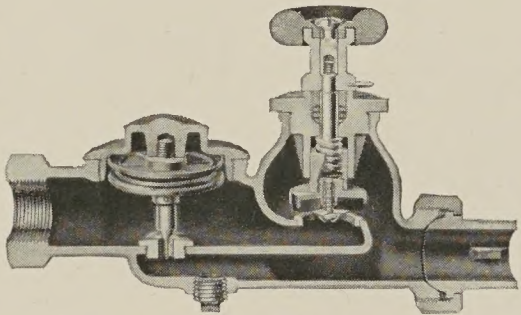


Fig. 21. Webster Double Service Valve

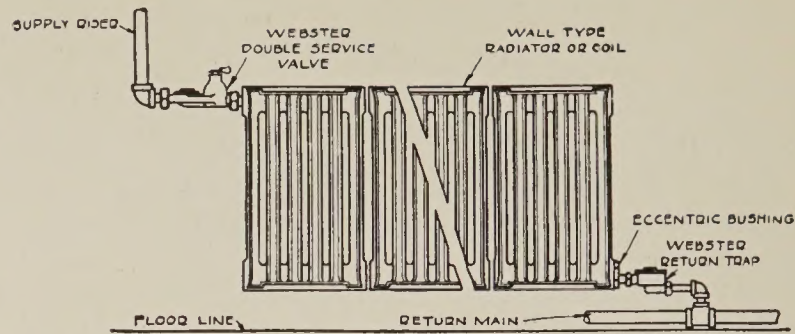


Fig. 22. Application of Webster Double Service Valve

TABLE XIII. Dimensions of Double Service Valves

Size	A	B	C	D	E	G
3/4"	3 1/4	7/8	4 3/8	2 1/4	1	4 3/8
1"	3 3/4	1 1/4	5 3/16	2 3/8	1	5 3/4
1 1/4"	4 1/16	1 7/16	5 7/8	2 3/8	1 1/16	6 3/8
1 1/2"	4 1/2	1 9/16	5 7/8	2 3/8	1	6 1/8

All dimensions in inches and subject to slight variation.

Webster Traps

A number of different types of low pressure traps are provided for use in Webster Systems to discharge condensation and air from radiators, drips, unit heaters, blast radiation, etc., giving a choice to meet every operating condition.

Webster Syphon Trap

Original and highly perfected type of low pressure thermostatic bellows trap. Effectively discharges all condensation and entrained air from radiators or coils without permitting passage of steam. Operation is by means of a liquid contained in the rugged Syphon Bellows. Factory adjusted, and made in 1/2, 3/4 and 1 in. sizes. Maximum pressure 10 lb. per sq. in. For normal operating pressures not exceeding 5 lb. per sq. in. See table XIV for ratings.

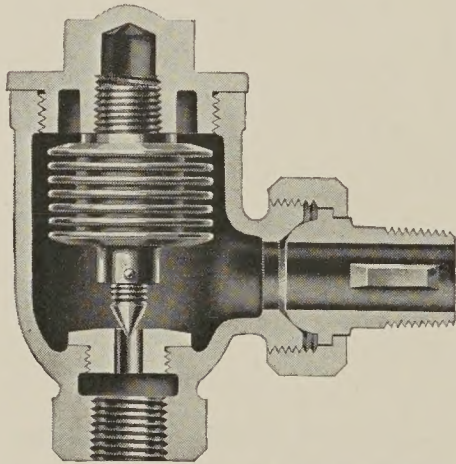


Fig. 23. Webster 512 Syphon Trap

TABLE XIV. Rated Capacities of Webster Low Pressure Traps

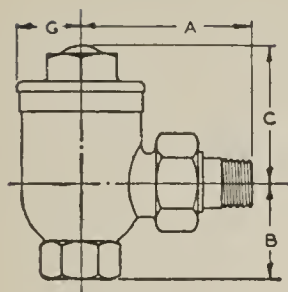
(For press. difference across trap in lb. per sq. in.) Select trap by rating, not by pipe size. For Improved Webster Systems using metering orifices, it is recommended that the selection of traps be based on 1/4 lb. per sq. in. press. diff.

Size	Press. diff. in lb. per sq. in.								
	1/10	1/4	1/2	1	2	5	7 1/2	10	15
Series 26 Drip Traps in Lbs. Water per Hour									
00026	50	75	100	145	200	285	345	370	430
0026	160	250	350	500	700	1000	1200	1300	1500
026	330	510	660	920	1200	1500	1670	1850	2250
Webster Heavy Duty Traps in Lbs. Water per Hour									
0019-T	270	420	600	860	1200	1900	2350	2700	3350
019-T	540	840	1200	1720	2400	3800	4700	5400	6700
119-T	1080	1720	2450	3500	4900	7800	9600	11100	13600
219-AT	1750	2840	4000	5700	8000	12800	15600	18000	22200
219-T	2560	4150	5850	8350	11700	18700	22900	26400	32500

No allowance made for pressure drop in the connecting piping between radiation and trap or from trap through run-out to return.

Size	Press diff. in lb. per sq. in.										
	1/10	1/4	1/2	1	1 1/2	2	5	10	15	25	
Syphon and Series "7" Traps in Sq. Ft. E.D.R.											
1/2-in.—502 and 702	55	85	120	165	200	235	370	530	.....	.....	
1/2-in.—512 and 712	105	165	230	330	400	465	730	1050	.....	.....	
3/4-in.—513 and 713	105	165	230	330	400	465	730	1050	.....	.....	
3/4-in.—523 and 723	185	290	410	580	700	810	1280	1840	.....	.....	
1-in.—534 and 734	315	500	710	1005	1200	1420	2270	3110	.....	.....	
Series "7-M" Traps in Sq. Ft. E.D.R.											
1/2-in.—702-M	55	85	120	165	200	235	370	530	640	840	
1/2-in.—712-M	105	165	230	330	400	465	730	1050	1275	1640	
3/4-in.—713-M	105	165	230	330	400	465	730	1050	1275	1640	
3/4-in.—723-M	185	290	410	580	700	810	1280	1840	2260	2900	
1-in.—734-M	315	500	710	1005	1200	1420	2270	3110	3920	5070	

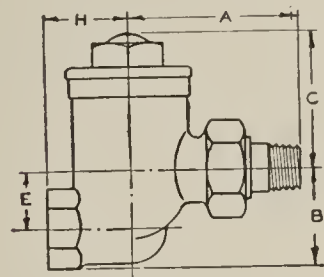
In above table ratings are given Equivalent Direct Radiation (E.D.R.) based on 240 B.T.U. per sq. ft. per hour.

TABLE XV. Dimensions of Webster Sylphon Traps
Angle Bodies


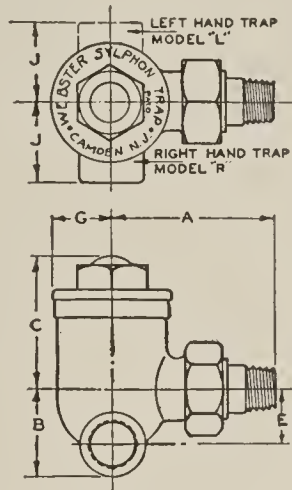
Size	A	B	C	G
1/2" - 502	2 3/4	1 1/8	1 13/16	1 3/16
1/2" - 512	3 1/8	1 5/8	2 3/8	1 1/8
3/4" - 513	3 1/8	1 3/4	2 3/8	1 1/8
3/4" - 523	3 5/16	1 7/8	3 1/16	1 5/16
1" - 534	4	2 5/8	3 1/16	1 3/4

All dimensions in inches and subject to slight variation.

Right-corner, Left-corner and Straightway Bodies



All dimensions in inches and subject to slight variation.



Size	A	B	C	E	G	H	J
1/2" - 502	2 3/4	1 7/16	1 13/16	3/4	1 3/16	1 9/16	1 9/16
1/2" - 512	3 1/8	1 11/16	2 3/8	1	1 1/8	1 1/2	1 1/2
3/4" - 523*	3 5/16	2 3/16	3 9/16	1 1/4	1 5/16	1 7/8	1 7/8

*Made in straightway body only.

Webster Series "7" Return Trap—A perfected diaphragm-type thermostatic trap unusually strong in construction. A notable record of trouble-free service (almost a million now in use) has led to its adoption by hundreds of architects and engineers. Uses as operating member a triple-sealed, phosphor bronze diaphragm. Important feature is cone valve and renewable sharp-edged seat. Each trap is individually adjusted and tested at factory. Made in 1/2, 3/4 and 1 in. sizes. Maximum pressure—10 lb. per sq. in. For normal operating pressures not exceeding 5 lb. per sq. in. See table XIV for ratings.

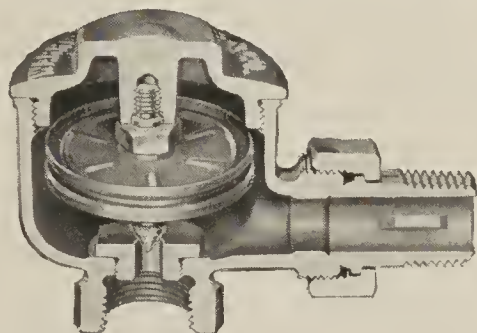
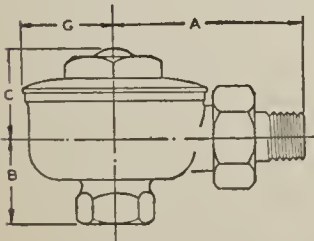


Fig. 24. Webster Size 702 Trap

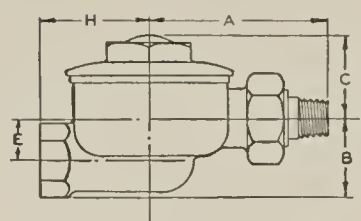
Webster Series "7-M" Trap—Used where normal operating pressures will prevail up to 15 lb. per sq. in. Maximum occasional pressure is 25 lb. per sq. in. The series "7-M" Trap is similar to the Standard Series "7" Type but has been still further reinforced to meet the higher pressures by heavy gauge monel metal diaphragm, cone valve piece and seat insert. See table XIV for ratings.

 TABLE XVI. Dimensions of Webster Series "7" and "7-M" Traps
Angle Bodies


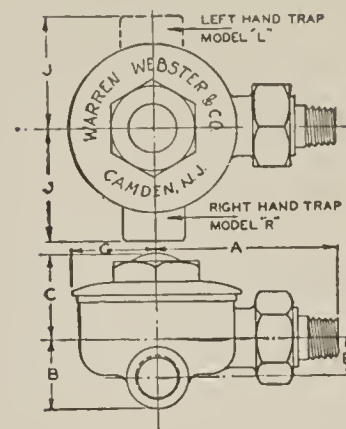
Size	A	B	C	G
1/2" - 702	2 3/4	1 1/8	1 13/16	1 3/16
1/2" - 712	3 5/16	1 7/16	1 9/16	1 5/8
3/4" - 713	3 5/8	1 7/16	1 9/16	1 5/8
3/4" - 723	3 7/8	1 5/8	2 1/16	1 7/8
1" - 734	4 1/2	2	2 3/16	2 1/8

All dimensions in inches and subject to slight variation.

Right-corner, Left-corner and Straightway Bodies



All dimensions in inches and subject to slight variation.



Size	A	B	C	E	G	H	J
1/2" - 702	2 3/4	1 7/16	1 3/4	3/4	1 3/16	1 9/16	1 9/16
1/2" - 712	3 5/16	1 7/16	1 9/16	3/4	1 5/8	1 7/8	1 7/8
3/4" - 723*	3 7/8	1 3/4	2 1/16	1 3/16	1 7/8	2 1/4	2 1/4

*Made in straightway body only.

Webster Series 26 Drip Traps

Model 26-T—A heavy duty trap, capable of handling large volumes of condensation and air, and at the same time compact and light in weight. Suited for drips of mains, blast radiation, unit heaters and similar applications. The specification calling for a heavy duty, float-type trap is fully met, while the advantages of the thermostatic element and ease of installation are both retained. Side outlet opening of ample size permits the discharge of water, or water and air. In the bottom of the trap are plugged clean-out openings. Size 0026 has integral dirt strainer; other sizes do not.

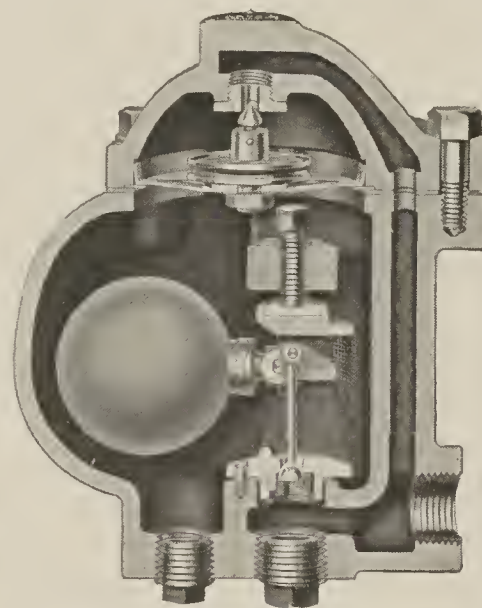
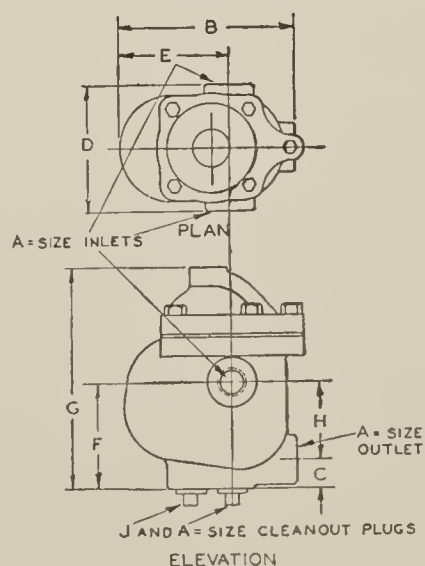


Fig. 25. Webster Size 0026-T Drip Trap

A choice of two inlet openings is provided in sizes 0026 and 026. Size 00026 has a single inlet opening on side. Light in weight, so that it may be handled easily and mounted in pipe line without other support. Maximum working pressure, 15 lb. per sq. in. See table XIV for ratings.

TABLE XVII. Dimensions of Webster Series 26 Drip Traps, Model T

Note: All drip traps are shipped with one inlet plugged. Plug the inlet which will not be used.



Size	A	B	C
0026-T*	3 1/4 & 1	6 3/8	1 1/8
026-T	1 1/4 & 1 1/2	8 1/8	2 5/8

Size	D	E	F
0026-T*	4 1/2	3 15/16	3 15/16
026-T	5 3/8	4 7/8	5 5/8

Size	G	H	J
0026-T*	8 1/8	2 13/16	3 1/4 & 1
026-T	9 15/16	3	1 1/4

 All dimensions are in inches.
*Size 00026 has 1/2" inlet and outlet. Dimension B is 6 3/8", D is 3 3/4", G is 6 1/2".

Model 26-O—Similar to the Model 26-T Drip Trap but without thermostatic element. Preferred for all applications where concentration of air does not occur, such as on ends of mains and risers, flash tanks and dripping gravity heating systems into vacuum return lines. Available in sizes 0026 and 026 only.

TABLE XVIII. Dimensions of Webster Series 26 Drip Traps, Model O

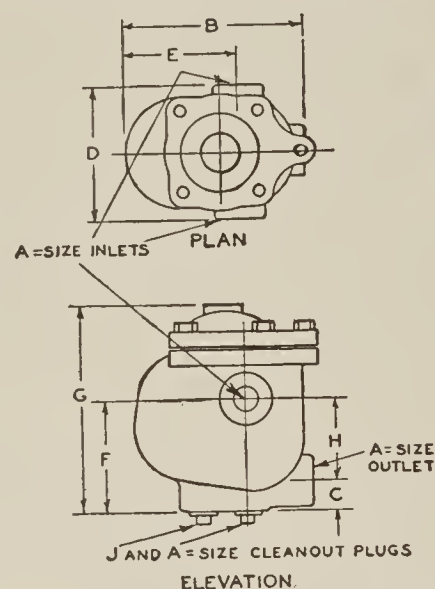
Note: All drip traps are shipped with one inlet plugged. Plug the inlet which will not be used.

Size	A	B	C
0026-O	$\frac{3}{4}$ or 1	$6\frac{3}{8}$	$1\frac{1}{8}$
026-O	$1\frac{1}{4}$ or $1\frac{1}{2}$	$8\frac{1}{8}$	$2\frac{5}{8}$

Size	D	E	F
0026-O	$4\frac{1}{2}$	$3\frac{15}{16}$	$3\frac{15}{16}$
026-O	$5\frac{3}{4}$	$4\frac{7}{8}$	$5\frac{5}{8}$

Size	G	H	J
0026-O	$7\frac{1}{16}$	$2\frac{13}{16}$	$\frac{3}{4}$ or 1
026-O	$8\frac{1}{16}$	3	$1\frac{1}{4}$

All dimensions are in inches.



Webster Heavy Duty Trap, Series 19-T

Used to remove condensation where it accumulates in large quantities, as in large steam mains, hot water generators and fan heater coils. Operates on the float principle for discharge of condensation and has a large water outlet to withdraw it quickly from the unit to be drained. Air is discharged through thermostatic by-pass. Sizes, $\frac{3}{4}$ to 2 in.

Maximum working pressure, 15 lb. per sq. in. See table XIV for ratings.

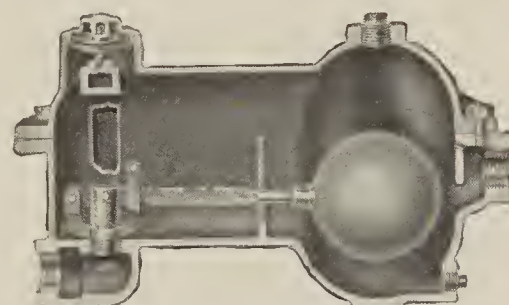


Fig. 26. Webster Heavy Duty Trap, Series 19-T

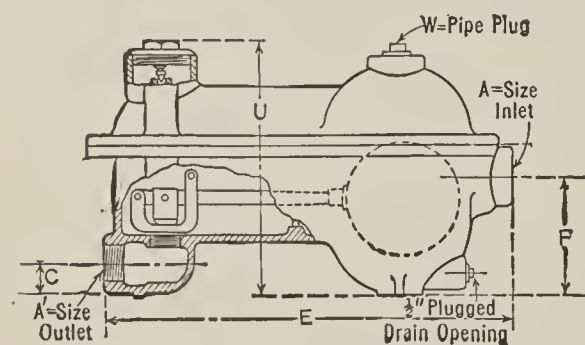


TABLE XIX. Dimensions of Webster Heavy Duty Traps, Series 19-T

Symbol	A-A ¹	C	E	F	U	W
0019-T	$\frac{3}{4}$	1	$12\frac{5}{8}$	4	$9\frac{1}{4}$	$1\frac{1}{2}$
019-T	1	1	15	$4\frac{1}{4}$	10	$\frac{3}{4}$
119-T	$1\frac{1}{4}$	$1\frac{7}{16}$	$18\frac{3}{8}$	$5\frac{5}{16}$	$11\frac{1}{2}$	1
219-T & AT	2	$1\frac{5}{8}$	$19\frac{1}{16}$	$6\frac{1}{16}$	$13\frac{1}{8}$	$1\frac{1}{2}$

All dimensions in inches and subject to slight variation.

Webster Dirt Strainers and Pockets

Placed in return lines of steam heating systems to catch dirt, rust, scale and other particles, preventing them from impairing the tightness of traps. More dependable than pockets made of pipe and fittings, cost less to install, and are more readily cleaned.

Where the probability of dirt is greater than normal, Series 18 Dirt Strainers should be used in place of Series 26 Dirt Pockets.

Maximum working pressure, 15 lb. per sq. in., except Series "78," which is 125 lb. per sq. in.



Fig. 27. Series 26 Dirt Pocket

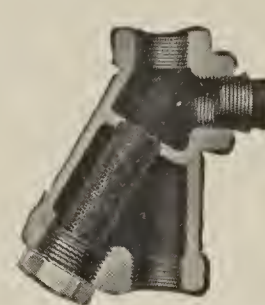


Fig. 28. Series "78" Dirt Strainer

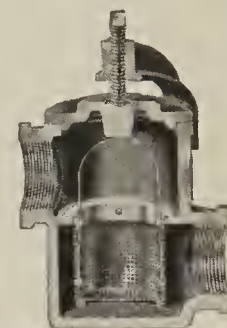
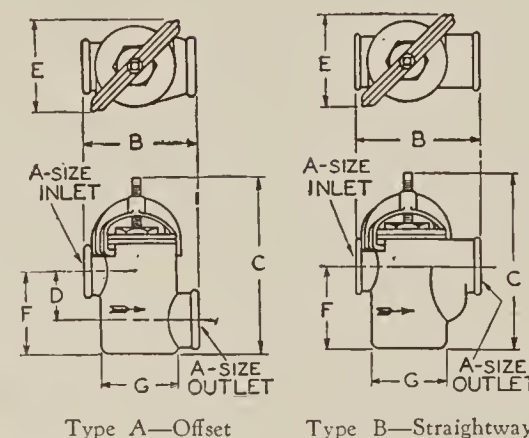


Fig. 29. Series 18 Dirt Strainer

TABLE XX. Dimensions of Webster Series 18 Dirt Strainers



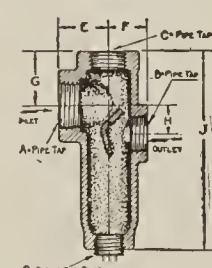
Type A—Offset

Type B—Straightway

Symbol	A	B	C	D	E	F	G
018-A	$\frac{1}{2}$ or $\frac{3}{4}$	$3\frac{1}{2}$	6	$1\frac{3}{4}$	$2\frac{3}{4}$	$2\frac{3}{4}$	$2\frac{1}{2}$
118-A	1 or $1\frac{1}{4}$	$4\frac{3}{4}$	$7\frac{3}{8}$	2	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{4}$
218-A	$1\frac{1}{2}$ or 2	6	$9\frac{1}{4}$	3	$4\frac{3}{4}$	$4\frac{3}{4}$	$4\frac{1}{4}$
018-B	$\frac{1}{2}$ or $\frac{3}{4}$	$4\frac{1}{4}$	6	.....	$2\frac{3}{4}$	$2\frac{3}{4}$	$2\frac{1}{2}$
118-B	1 or $1\frac{1}{4}$	$5\frac{1}{2}$	$7\frac{3}{8}$	.....	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{4}$
218-B	$1\frac{1}{2}$ or 2	$7\frac{1}{4}$	$9\frac{1}{4}$	.....	$4\frac{3}{4}$	$4\frac{3}{4}$	$4\frac{1}{4}$

All dimensions in inches and subject to slight variation.

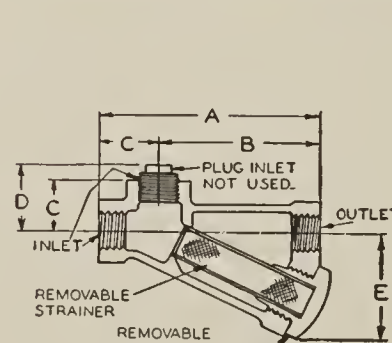
TABLE XXI. Dimensions of Webster Series 26 Dirt Pockets



Symbol	A	B	C	D	E	F	G	H	J
526	$1\frac{1}{4}$	1	1	$\frac{3}{4}$	$1\frac{3}{4}$	$1\frac{3}{8}$	$1\frac{7}{8}$	1	$6\frac{7}{8}$
826	2	$1\frac{1}{4}$	$1\frac{1}{4}$	1	$2\frac{1}{8}$	$1\frac{5}{8}$	$2\frac{5}{16}$	$1\frac{1}{2}$	$7\frac{7}{8}$
1026	$2\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{4}$	$2\frac{5}{8}$	$1\frac{3}{4}$	$2\frac{3}{4}$	$1\frac{5}{8}$	$9\frac{1}{4}$
1226	3	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{4}$	$2\frac{3}{4}$	$1\frac{3}{4}$	$3\frac{1}{16}$	$1\frac{7}{8}$	$10\frac{5}{8}$

All dimensions in inches and subject to slight variation.

TABLE XXII. Dimensions of Webster Series "78" Dirt Strainers



All dimensions in inches and subject to slight variation.

Symbol	Inlet and outlet tappings	Dimensions		
		A	B	C
782	$\frac{1}{2}$ "	$4\frac{1}{2}$	$3\frac{3}{8}$	$1\frac{1}{8}$
*782B	$\frac{1}{2}$ "	$4\frac{1}{2}$	$3\frac{3}{8}$	$1\frac{1}{8}$
783	$\frac{3}{4}$ "	$4\frac{1}{2}$	$3\frac{1}{2}$	$1\frac{1}{8}$
*783B	$\frac{3}{4}$ "	$4\frac{1}{2}$	$3\frac{1}{2}$	$1\frac{1}{8}$
784	1"	$5\frac{9}{16}$	$4\frac{1}{8}$	$1\frac{7}{16}$

Symbol	Inlet and outlet tappings	Dimensions	
		D	E
782	$\frac{1}{2}$ "	$1\frac{1}{2}$	$2\frac{1}{4}$
*782B	$\frac{1}{2}$ "	$1\frac{1}{2}$	$2\frac{3}{16}$
783	$\frac{3}{4}$ "	$1\frac{1}{2}$	$2\frac{3}{4}$
*783B	$\frac{3}{4}$ "	$1\frac{1}{2}$	$2\frac{3}{4}$
784	1"	$2\frac{1}{16}$	$3\frac{1}{16}$

*Brass body, nickel plated, polished trim.

Specification: (See Webster Series "78" Traps.)

Webster Suction Strainers

Installed ahead of vacuum pump to prevent dirt and scale, brought down with condensation from heating system, from damaging pump with resultant troubles.

A tapping is provided for introduction of cold water make-up when that is desired; another for connection to a vacuum gauge. Made of heavy cast iron with flanged connections. Companion flanges included as standard. Cleanout cover is bolted on with rubber gasket joint. Screen basket is made of sheet brass with No. 4 holes (.045 in. dia.), 225 holes per sq. in. and is easily removable for cleaning. Maximum working pressure, 15 lb. per sq. in.

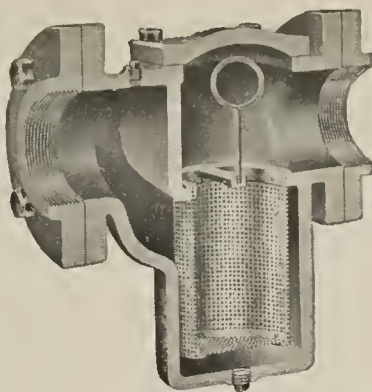


Fig. 30. Webster Suction Strainer

Webster Type "Y" Strainer

For use on water lines to remove sediment, hair, leaves, etc., and thus protect pumps and other machinery. Used extensively for swimming pools and supply lines of railroad water tanks. Exact duplicate of Suction Strainer except screen basket which is of heavier material and has No. 11 holes (0.1 in. dia.) and 49 holes per sq. in.

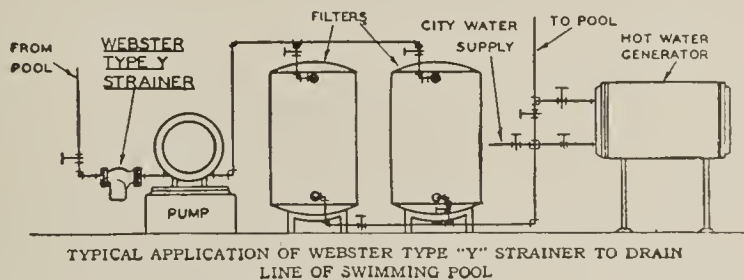
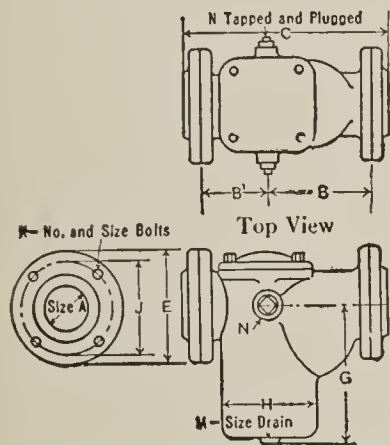


Fig. 31. Typical Application of Webster Type "Y" Strainer to Drain Line of Swimming Pool

TABLE XXIII. Dimensions of Webster Type "Y" and Suction Strainers



All dimensions in inches and subject to slight variations.

Size	A	B	B ¹	C	E	G	H
2	5 5/8	4 3/8	12	6	6 7/8	5 1/4	5 1/4
3	6 5/8	4 7/8	13 3/4	7 1/2	8 7/8	5 3/4	5 3/4
4	8 3/16	5 13/16	16 3/8	9	10 5/8	7 1/8	7 1/8
5	9 5/8	6 3/8	18 5/8	10	12 1/8	8 1/4	8 1/4
6	10 15/16	7 1/16	20 7/8	11	13 3/4	9 5/8	9 5/8
8	14 1/8	9 7/8	27 1/4	13 1/2	21	14 1/2	14 1/2
10	17 1/4	11 1/4	32 1/4	16	24 7/8	16 3/4	16 3/4
12	21	12 7/8	38	19	29	20	20

Size	A	J	K	M	N
2	4 3/4	4-5/8 x 2	1 1/2	3/4	3/4
3	6	4-5/8 x 2 1/4	1 1/2	3/4	3/4
4	7 1/2	8-5/8 x 2 3/4	1 1/2	3/4	3/4
5	8 1/2	8-3/4 x 2 3/4	1 1/2	3/4	3/4
6	9 1/2	8-3/4 x 2 3/4	1 1/2	3/4	3/4
8	11 3/4	8-3/4 x 3 1/8	3/4	1	1
10	14 1/4	12-7/8 x 3 1/2	3/4	1	1
12	17	12-7/8 x 3 1/2	3/4	1	1

Webster Type "R" System Basement Equipment

Quick circulation, despite variations in boiler pressures, is assured in Webster Type "R" Systems through the combination of the Webster Boiler Return Trap and Vent Trap. Air escapes from the system through the Webster Vent Valve. Water returns direct to the boiler by gravity at low pressures. An increase of pressure causes the Webster Boiler Return Trap to fill and operate, equalizing the pressure and making positive the prompt return of water to the boiler. Units are made to provide five sizes of the Webster Boiler Return Trap and Vent Trap combination, having the range of capacities given in Table XXIV.

Each Type "R" Combination must include a Webster Series 24 Dirt Strainer and (2) Webster 45° Check Valves.

Webster Boiler Return Trap

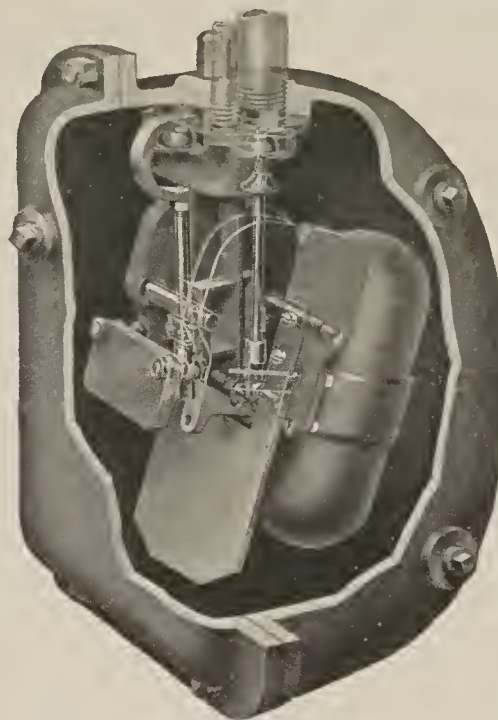


Fig. 32. Webster Boiler Return Trap

Positive acting reciprocating device for returning water to boilers in Webster Type "R" Systems. Construction is shown in Fig. 32. The float is of heavy gauge metal with no exposed seams. The entire mechanism is held in place by two studs and is removable as a unit. It turns on a single Monel Metal shaft. Steam valve opens quickly when high level is reached. No wire drawing. Valves are all-metal and self-aligning. Operation is silenced by stainless steel bumper springs and large area baffle.

Webster Vent Trap with Vent Valve

Used in conjunction with the Webster Boiler Return Trap, to provide a dependable method of removing air from heating systems and automatically preventing its return, at the same time making overflow of condensation impossible.

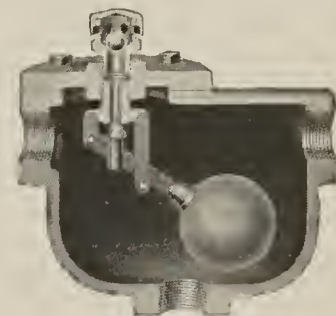


Fig. 33. Webster Vent Trap with Vent Valve

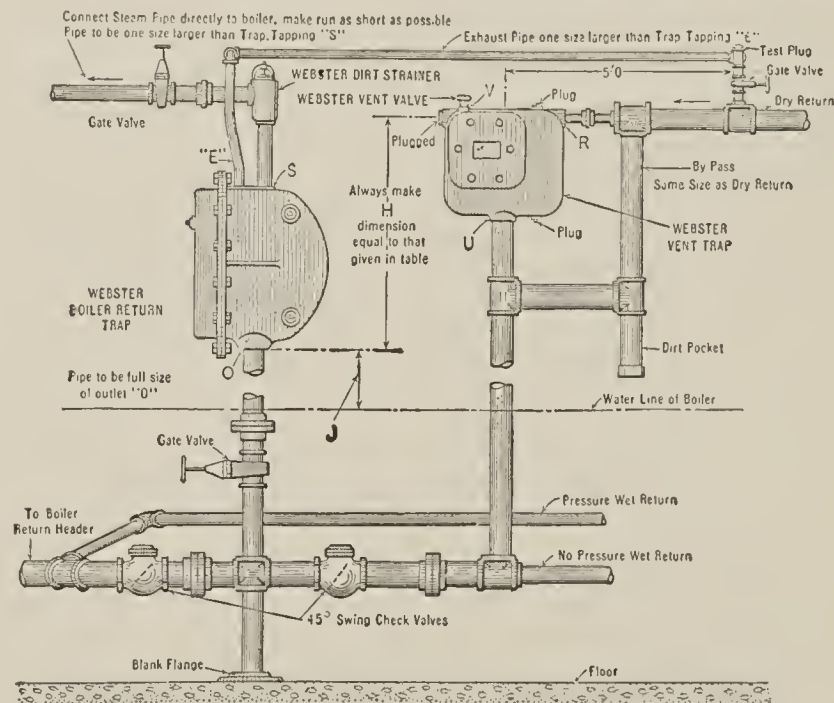


Fig. 34. Conventional Arrangement of Webster Type "R" System Equipment

TABLE XXIV. Data and Ratings for Webster Type "R" System Basement Equipment (Refer to Fig. 34*)

Rating sq. ft. dir. rad.	Size Boiler Re- turn Trap	Tappings			Size Vent Trap	Num- ber of 1/2 in. Vent Valves	Tappings			Dimen- sions		Size Dirt Strainer	Size Check Valves (2 Req'd)
		E	O	S			R	U	V	H	J		
0-1500	0023	1 1/2	1 1/4	3/4	0023	1	1	1	1 1/2	14 1/4	5	024	1 1/4
1501-2500	023	1 1/2	1 1/2	1 1/4	023	1	1	1 1/2	1 1/2	16 3/4	6	124	1 1/2
2501-4000	123	1 1/2	2	1 1/4	123	1	1 1/4	2	1 1/4	18 3/4	6	124	2
4001-8000	223	2 1/2	2 1/2	1 1/2	223	2	1 1/4	2 1/2	1 1/4	23	6	224	2 1/2
8001-16000	323	3 1/4	3 1/4	1 1/2	323	3	1 1/4	3 1/4	1 1/4	26 3/4	6	224	3

*All dimensions in inches. †Flanged.

Webster Damper Regulator

Controls and maintains pressure of only a few ounces. Used with hand-fired, coal-burning low pressure boilers in Webster Vacuum and Type "R" Systems when normal operation is from 2 ounces to a maximum pressure of 2 lb. per sq. in. at boiler. Applicable in stoker-fired installations only in exceptional cases when damper regulator controls air supply damper; with oil-burners, only when throttling type burner is used.

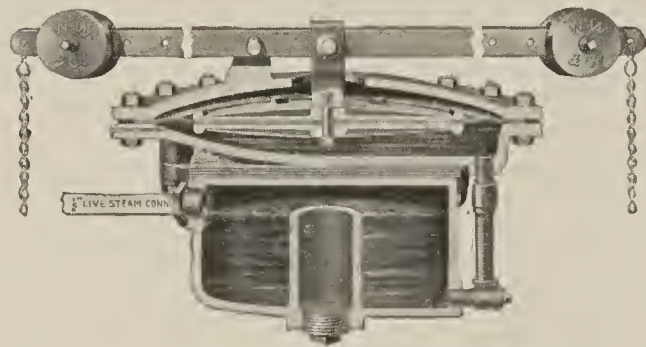


Fig. 35. Webster Damper Regulator

The well, diaphragm casing and plates are made of cast iron, the lever of steel, and the diaphragm of rubber. An asbestos disc between the lower casing and the well prevents the transfer of heat to the diaphragm chamber from the steam in the upper part of the well.

Webster Boiler Protector

Provided to prevent breakage in low pressure cast iron boilers when the water level becomes inadequate. Automatically supplies raw water to boiler when water level drops to 1 in. above bottom of gauge glass.

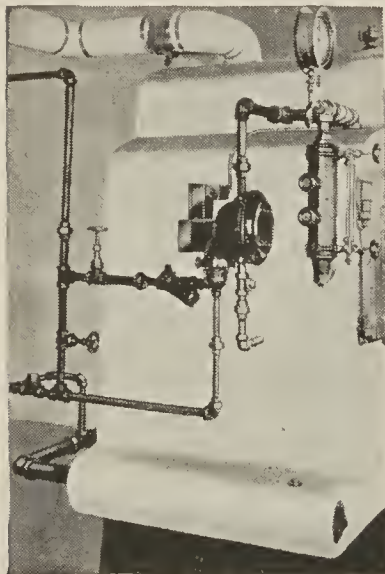


Fig. 36. Size 0030-C, Webster Boiler Protector, with Electrical Cut-out Switch, Installed on Low Pressure Heating Boiler

Body is made of cast iron with three principal parts bolted together. Interior parts of copper, brass or Monel Metal to withstand corrosion. Seamless float of standard type actuating cone pilot valve on sharp-edged seat. Water valve with standard Jenkins composition disc actuated by difference in water pressure between exterior and interior of Sylphon Bellows to which it is attached.

Adapted to almost all types of low pressure heating boilers where maximum pressure will not exceed 15 lb. per sq. in. Maximum cold water main pressure should not exceed 150 lb. per sq. in.; minimum must not be less than 25 lb. per sq. in.

Made in two sizes, 0030 and 030, both with 3/4-in. connections. Also Model 0030-C with electrical cut-out switch.

TABLE XXV. Capacity of Webster Boiler Protectors

Boiler pressure, lb.	Water main pressure, lb.	Pressure difference, lb.	Capacity—gallons per min.	
			Size 030	Size 0030
5	25	20	12 0	5 3
5	35	30	15 6	6 6
5	55	50	20 0	8 6
5	75	70	23 4	10 1
5	105	100	27 2	11 9

Webster Expansion Joints

Webster Expansion Joints are constructed with cast iron bodies and brass slip sleeves, and in both single and double slip types. The bodies of Webster Expansion Joints are provided with anchors integral with the body castings. Service connections are provided for convenience in tapping the steam main for branch piping. Drip outlets are also provided.

Made in three classes: (1) For working pressure of 15 lb. per sq. in.; (2) for 125 lb. per sq. in.; (3) for 150 lb. per sq. in.

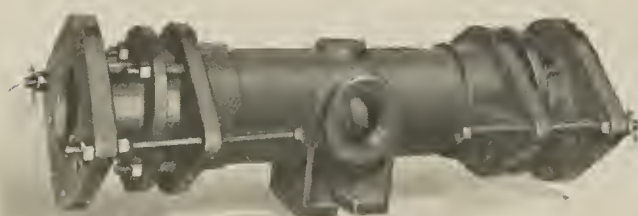


Fig. 37. Webster Expansion Joint

Sizes range from 1 1/2 to 20 in., according to class. Write for complete information.

Webster Lift Fittings

The improved design of Webster Lift Fittings makes possible quicker starting of the lift and retains all the advantages of the earlier design.

For use where condensation is to be lifted to a higher level. More efficient than "lifting pockets" made of standard fittings; require less time, and costs less to install.

Sizes 3/4 to 8 in.

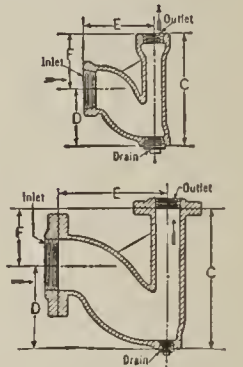


Fig. 38. Webster Lift Fitting

TABLE XXVI. Dimensions of Webster Lift Fittings

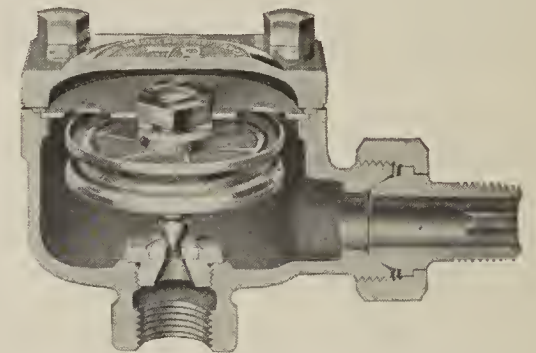
Size	Inlet	Outlet	C	D	E	F	Drain
3/4"	3/4	3/8	3 1/2	1 3/4	2 3/4	1 3/4	3/8
1"	1	1/2	3 3/4	1 7/8	3 1/8	1 7/8	1/2
1 1/4"	1 1/4	3/4	4 3/4	2 3/8	3 1/2	2 3/8	3/4
1 1/2"	1 1/2	3/4	5 1/2	2 3/4	4 1/4	2 3/4	3/4
2"	2	1	7 1/4	3 5/8	4 1/2	3 5/8	1
2 1/2"	2 1/2	1 1/4	8 3/4	4 3/8	6 1/2	4 3/8	1
3"	3	1 1/2	9 1/4	5 1/4	7 1/2	5 1/4	1
4"	4	2	11 5/8	6 5/8	9 1/4	6 5/8	1
5"	5	2 1/2	13 5/8	8 1/8	10 3/4	8 1/8	1
6"	6	3	15 5/8	9 5/8	12	9 5/8	1
8"	8	4	25 1/4	16 1/4	17	16 1/4	1

All dimensions in inches and subject to slight variation.
*Flanged.



Webster Series "78" Traps for "Process Steam" Pressures (10 to 125 lb. per sq. in.)

A thermostatic trap used to discharge air and water of condensation from heating coils and any apparatus using steam at process pressures, i. e., 10 to 125 lb. per sq. in. Built in four sizes: 3/8, 1/2, 3/4 and 1 in. There are two classes: Class 2 for pressures of 10 to 60 lb. and Class 3 for pressures of 60 to 125 lb.



Specification: The return end of each (insert name of unit) shall be provided with a separate Webster Series "78" Trap and Webster Series "78" Dirt Strainer of the size and class called for on the plans. Connections shall be made according to service details of the manufacturer.

Fig. 39. Webster Series "78" Trap

TABLE XXVI. Rated Capacities of Webster Series "78" Traps*

Size of trap	Class 2—Working pressures up to 60 lb. per sq. in.									
	Pressure differential, lb. per sq. in.									
	1	5	10	20	30	40	50	60	80	100
3/8"—780	6	20	33	53	70	88	100	120	145	170
1/2"—782	14	40	64	100	130	158	180	205	245	283
3/4"—783	31	90	142	225	290	350	400	460	550	640
1"—784	70	200	315	490	640	770	900	1000	1204	1400
Class 3—Working pressures up to 125 lb. per sq. in.										
3/8"—780	4	13	22	36	48	60	70	80	99	115
1/2"—782	11	32	51	80	105	128	148	165	200	230
3/4"—783	25	72	112	178	230	280	325	360	440	500
1"—784	56	162	255	402	530	640	730	830	1000	1170

*Pressure differentials given in this table refer to pressure at inlet of trap and in return line. Select trap to handle maximum condition. For normal working pressures up to 60 lb. per sq. in., use Class 2 Traps even though occasional pressures may go above 60 lb. For normal pressures between 60 lb. and 125 lb., use Class 3 Traps. In this table ratings are given above 60 lb. for Class 2 Traps and below 60 lb. for Class 3 Traps merely to show performance at these special pressures.

TABLE XXVII. Dimensions of Webster Series "78" Traps

No. of trap	Inlet	Outlet	A	B	C	G
780†	3/8	3/8	2 11/16	1 3/16	1 13/16	1 1/4
782*	1/2	1/2	3 9/16	1 7/16	1 15/16	1 5/8
783	3/4	3/4	3 13/16	1 7/16	2 3/8	1 13/16
784	1	1	4 1/2	2	2 7/16	2 3/8

All dimensions in inches and subject to slight variation.

†780 Trap furnished with 3/8-in. female nipple on special order. Dimension A = 2 3/4 in.

*782 Trap furnished on special order with 3/8-in. male nipple, also 3/8-in. or 1/4-in. female nipple to fit standard 1/2-in. union nut. Dimension A = 3 3/8 in.

WEBSTER SYSTEM RADIATION

(Concealed Non-ferrous Type)

Webster System Radiation is designed for use exclusively with Improved Webster Systems of Steam Heating. It cannot be used for hot water heating or one-pipe vapor or steam systems. Webster System Radiation is a logical development of the experience gained by Webster engineers in their work of assuring proper application and utilization of Webster System Equipment with many different types of radiation.

Webster System Radiation is far more than just another type of light-weight radiation. It combines in a single unit, a light-weight heating element of high efficiency with an orificed radiator supply valve, a radiator trap, and supply and return piping connections. This unit is entirely concealed by an accompanying metal enclosure which is furnished with the unit for installation within the wall. This unique combination of elements not only reduces the space requirements to a minimum but greatly simplifies installation and, in addition, places the responsibility for the correct functioning of all of these closely related items in the hands of one well-established manufacturer.

Webster System Radiation and enclosures are so designed that the entire heating element can be readily removed without damage to plaster or paint.

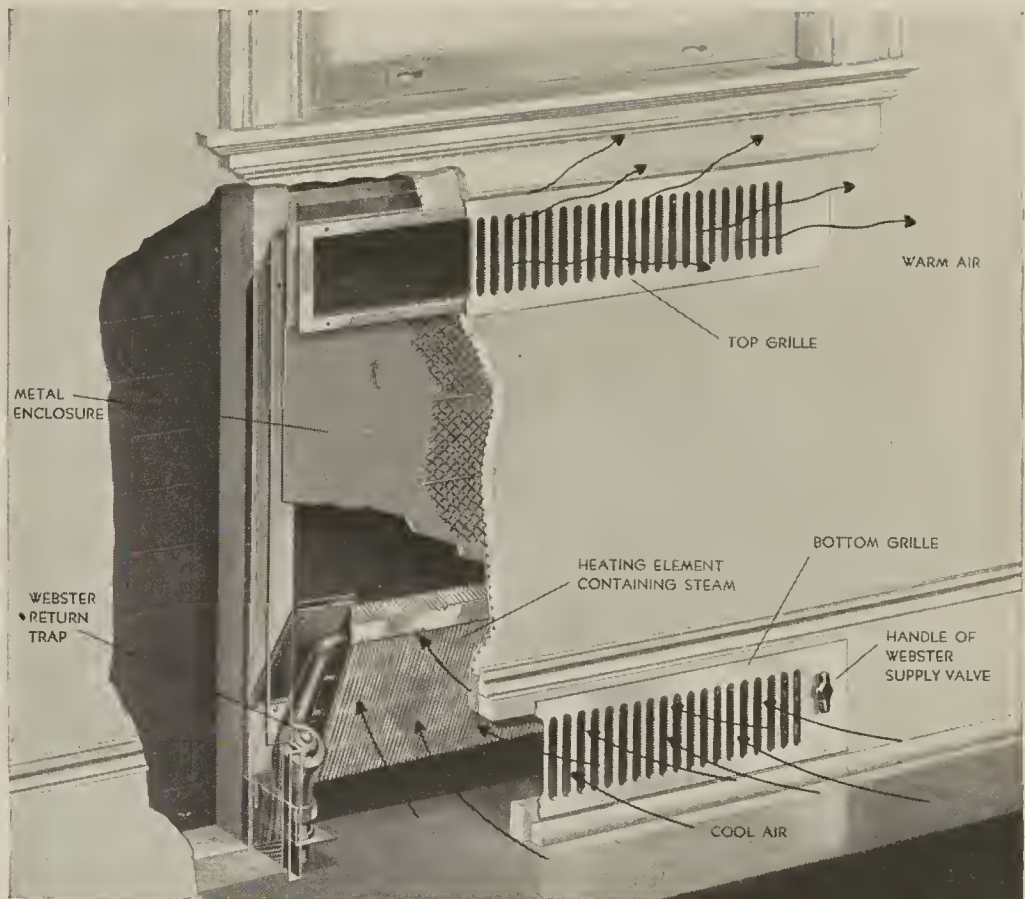


Fig. 41. How Webster System Radiation Heats the Room by Natural Circulation
Air from room is drawn in through lower grille and passes upward over heating element. As its temperature is raised air ascends and re-enters room through upper grille. As warm air gives up its heat by contact with objects in room and by mixture with cooler air, its temperature drops and it falls to floor level where it re-enters lower grille. Note supply valve handle outside lower grille, enabling room occupant to turn on or completely shut off heat

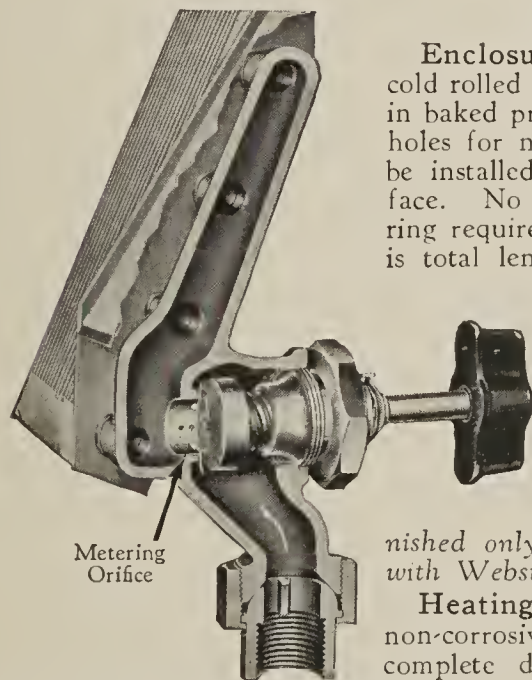


Fig. 40. Cut-away View of Supply Header
Showing Webster "Three-Point" Valve including metering orifice

per unit of space occupied. Tubes and headers connected by Mueller Streamline Joints.

Webster Three-Point Supply Valve With Sleeve-Type Metering Orifice incorporated in each unit. For detailed description of these features see pages 2 and 6.

Union Connections—For both steam and return are furnished as part of the radiator. Units furnished left-hand or right-hand but not convertible.

Metal Grilles—Of pleasing bar type design.

Webster Trap—Built into return header. Phosphor bronze diaphragm, removable sharp-edged seat, 60° cone valve piece.

Description

Enclosures are of heavy gauge, cold rolled (furniture) steel finished in baked prime coat. Provided with holes for nailing to studding. May be installed back of any wall surface. No special framing or furring required. Length of enclosure is total length of recess—unnecessary to add for valve and trap connections. Fixed support for heating element integral with enclosure eliminates necessity for adjustment or legs.

Note: Webster System Radiation is furnished only for use in conjunction with Webster enclosures.

Heating Element—Entirely of non-corrosive materials. Designed for complete drainage. Flat surfaced fins prevent lodging of dust and dirt. Element installed on an angle to provide maximum heat

Ease of Installation—The combination of supply valve, heating element and return trap in a single unit eliminates considerable roughing-in work, simplifies piping and reduces installation labor cost.

Enclosures

The requirements of widely varied architectural treatments and building construction are met without preparation of special architectural detailed drawings by one of the following types of Webster System Radiation:

(1) **Type AK**—For concealing within plaster, panel, tile, marble, stone, and other surfaced walls.

(2) **Type AKT**—Similar to Type AK Enclosure except having a No. 12 gauge, 3/4 in. square mesh, horizontally positioned top outlet grille. Two arrangements are available, a fixed top grille or an adjustable top grille.

(3) **Type AM**—Metal cabinet for enclosing within wall but having metal panel cover.

(4) **Type AE**—Free standing exposed cabinet.

(5) **Type AEH**—Hung type exposed cabinet.

Other types such as special institutional enclosures are available. Information upon request.

Provision has been made in all types of enclosures for positive control of heat by extending Webster Supply Valve handle through lower grille or opening. The handle is of pleasing shape and has been placed in an inconspicuous location yet is easily operable if room occupant desires to turn on or shut off heat.

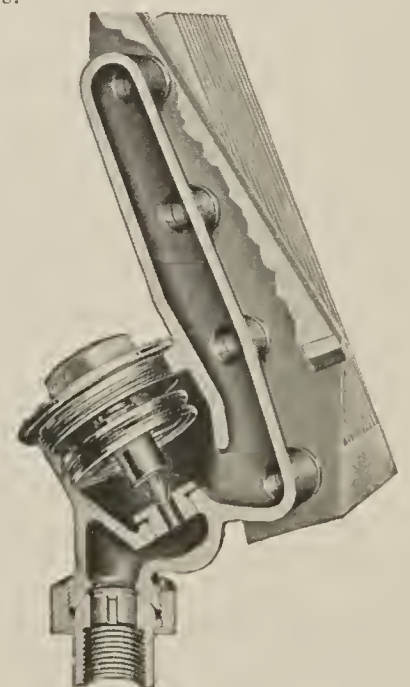


Fig. 42. Cut-away View of Return Header
Showing Webster Thermostatic Trap having sharp-edged removable seat and 60° cone valve piece

DATA FOR WEBSTER SYSTEM RADIATION

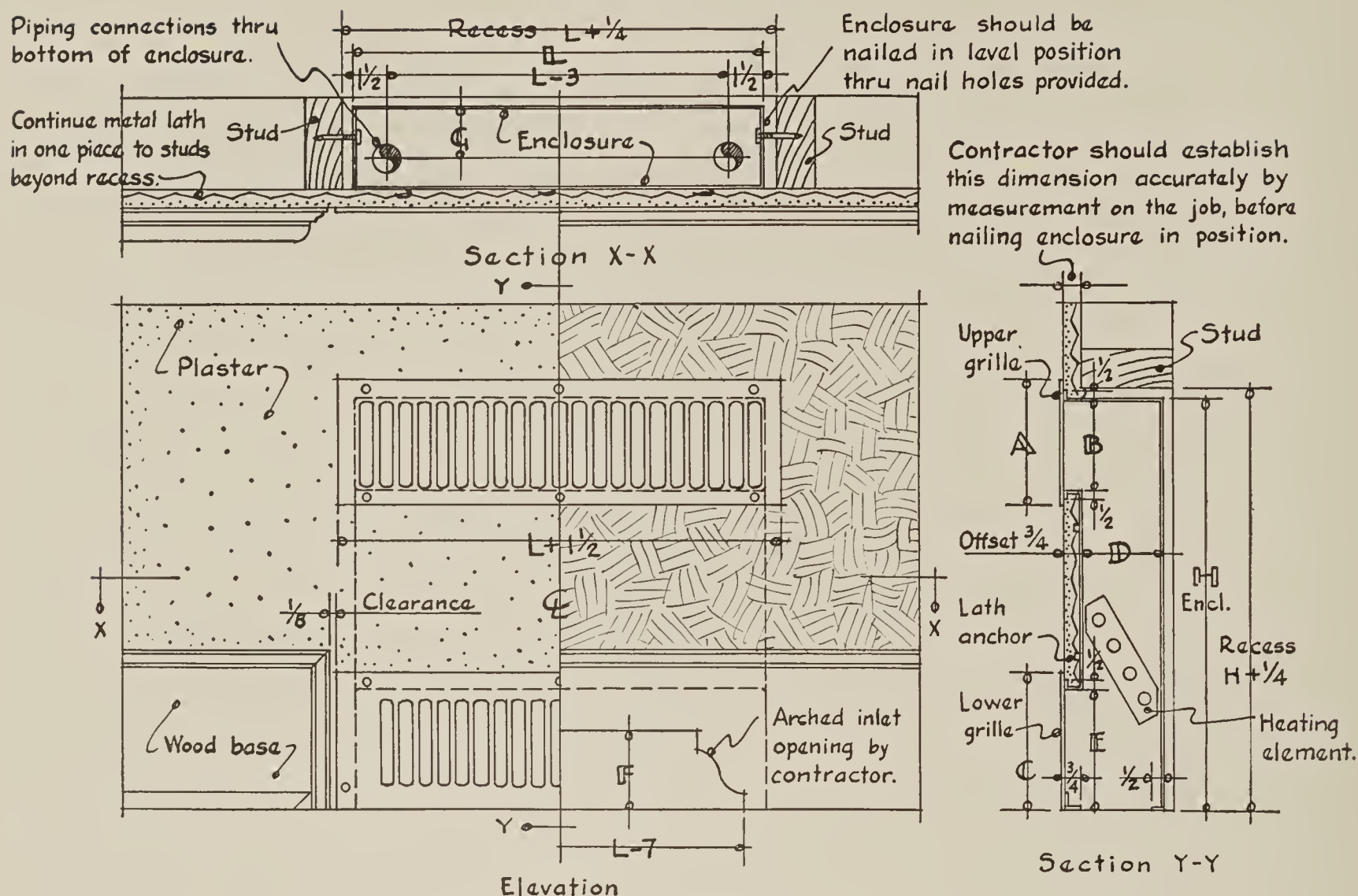


Fig. 43. Dimensions of Type AK Webster System Radiation

Note: $\frac{3}{4}$ -in. steam supply and $\frac{1}{2}$ -in. return piping connections should project 2-in. above finished floor

Table XXVIII. Type AK Ratings and Dimensions

Ratings given below are in sq. ft. e.d.r. and are based on the A.S.H. & V.E. Standard Steam Code for Testing and Rating Concealed Radiation plus a graduated heating effect factor. All dimensions are in inches and subject to slight variation.

D Depth inches	H Height inches	Ratings, sq. ft., E. D. R.								Dimensions						
		L—Length, inches								A	B	C	E	F	G	
		18	22	26	30	36	42	48	54							
3½	18	10	14	17	21	25	31	36	40	5½	4	6¾	6	3½	2¾	
	20	11	15	18	22	28	33	39	44	5½	4	6¾	6	3½	2¾	
	25	12	16	21	25	31	37	44	51	5½	4	6¾	6	3½	2¾	
	30	14	18	22	27	34	41	47	55	5½	4	6¾	6	3½	2¾	
4¾	18	12	15	20	23	29	35	40	46	5½	4	6¾	6	3½	3½	
	20	14	18	23	28	33	40	46	53	5½	4	6¾	6	3½	3½	
	25	17	22	26	32	40	47	55	63	5½	4	6¾	6	3½	3½	
	30	18	23	29	36	44	53	61	70	5½	4	6¾	6	3½	3½	
7½	18	17	23	29	35	44	54	62	69	6¾	5½	10	9½	4½	6¾	
	20	20	25	32	38	47	58	67	76	6¾	5½	10	9½	4½	6¾	
	25	22	29	35	43	53	64	75	86	6¾	5½	10	9½	4½	6¾	
	30	23	31	38	46	57	68	80	91	6¾	5½	10	9½	4½	6¾	

NOTE—Ratings of other types referred to on page 14 are same as given in this table.

Distinctive Grilles

Distinctive grilles to suit the individual taste may be used with Type AK enclosures. Since the free area of the grille is an important factor in establishing the heat output of convection radiation, special grilles should be checked with the grille area influence factor curve in Fig. 44 and correc-

tion to capacity requirements made if necessary. For example, if it is desired to use a special grille of 40% free area for a room requiring 50 sq. ft. of radiation, the size of radiator selected must be increased to 61.5 sq. ft., i.e., 1.23 times 50.

Caution: This correction curve is applicable to Webster System Radiation only.

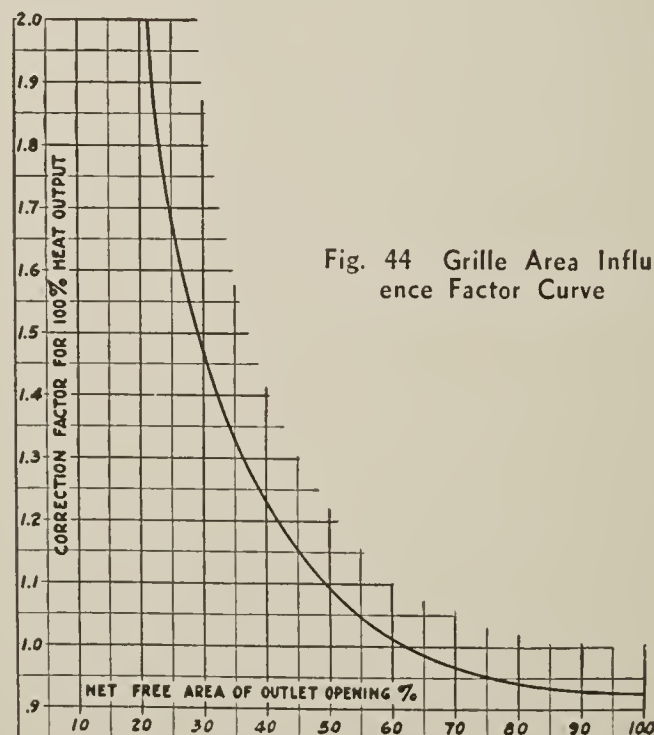


Fig. 44 Grille Area Influence Factor Curve

BASIC SPECIFICATIONS FOR WEBSTER SYSTEMS OF STEAM HEATING

FOREWORD

The Specifications below are only intended to describe basic heating (or steam circulation) systems. Heating requirements vary widely, making necessary changes in specifications of the individual installation. The services of our Engineers are available absolutely without obligation to

Architects or Specification Writers encountering any difficulty in using these basic specifications and may be secured by telephoning any of the local offices listed in the forepart of this catalogue. Complete standard specifications may be secured from Webster Engineers for any Webster System.

THE SYSTEM

General

These specifications and the accompanying plans are intended to describe the installation of a complete Improved Webster.....
..... System of Steam Heating in.....

The System is so designed and shall be installed in such a manner that all radiators get steam at the same time and in substantially the same proportion. This balanced steam distribution will be accomplished by Webster Metering Orifices installed in radiator supply valves (and by intermediate metering orifices installed in branch mains) as specified hereinafter.

Boiler

Furnish and erect on foundation provided under this contract one cast iron (steel) boiler No., as manufactured by the
Water line shall not exceed in.

The boiler shall be provided with a Webster Damper Regulator (include only with coal burning installations and boilers having throttling type oil burner), a Webster Modulation Gauge, a pop safety valve set to blow off at 5 lbs., a water column water gauge, gauge cocks and fusible plug, the necessary firing tools and all accessories and connections required under the State Laws. Damper Regulator shall be rigidly supported and connected by chains and pulleys to the check damper and check draft door and to the steam space of boiler by a 1/2 in. pipe fitted with a globe valve.

Smoke Pipe

Connect boiler to chimney with gauge black iron smoke pipe closely fitted. The pipe shall be provided with a damper and cleanout door with fastening device. Stack (to be provided by) will be
x in. x ft. high with cleanout door at base.

Boiler Protector

Heating Contractor shall furnish and install in cold water line to the boiler a Type Webster Boiler Protector in strict accordance with manufacturer's drawings, specifications and installation instructions.

Hot Water Heater

Furnish and install below water line of boiler one in. water heater capable of heating not less than gallons of water 100 degrees F. in 3 hours. This heater shall be so installed that top connection is approximately 1 1/2 in. below water line of boiler. A gate valve shall be installed in bottom connection from heater to return header on boiler. The water heater shall be connected as per sketch on plans and as recommended by the manufacturer.

Pipe

All pipe shall be of new material and made of full weight speller-ized steel (wrought iron) as manufactured by

All pipe must be reamed and cleaned before it is assembled. It must be installed in such a manner that due provision shall be made for expansion and contraction.

Fittings

All fittings shall be of the best quality heavy gray cast iron as manufactured by
Provide for disconnection of pipe by use of flanges and unions, unions to be ground joint type, as manufactured by
..... Use a stiff mixture of oil and graphite on male threads only for screw joints. Eccentric reducing fittings or eccentric reducing couplings shall be

used at all points where steam supply pipes are reduced in the horizontal run.

Piping

From the supply tapings of the boiler, lines provided with flanged unions shall be run and connected into a header from which the steam mains shall be taken. A drip line shall also be run from the steam header to the wet return header. Should a header-type boiler be used, no additional header will be required. The ends of mains and other low points in the steam mains shall be provided with Webster Dirt Pockets, or Dirt Strainers and Webster Traps as shown or called for on plans.

The base of each downfeed riser shall be dripped through a Webster Drip Trap where shown on the plans.

Risers shall be run where shown on plans. The laterals from risers to radiators shall be run in the floor construction or as approved by the Architect.

Connecting with the return risers, radiators and air lines, dry return mains shall be run overhead in basement or as noted on plans. Where the return mains start they shall be kept as high as possible.

The supply and dry return mains shall grade 1 in. in 20 ft. in the direction indicated by arrows on plans, while the laterals to risers and radiators shall be taken from the top and grade 3 in. in 10 ft. toward the mains.

A in. galvanized iron cold water pipe fitted with a brass cock shall be run from the cold water main to boiler and a in. drain line, also provided with a brass cock, shall be run from the lowest point of boiler.

Sleeves and Plates

Suitable sleeves, floor and ceiling plates of type approved by the architect shall be provided where pipes pass through walls, floors, etc.

Supports

The Heating Contractor shall provide substantial expansion pipe hangers to support all pipe. No perforated strip hangers will be permitted. Hangers should be spaced according to the weight and size of pipe they support to prevent it from sagging from line of grade.

Radiator Supply Valves

All radiators (heat cabinets, concealed heat units, etc.) shall be provided on the supply end with Webster Type Supply Valves.

Radiator Metering Orifices

All radiators and concealed heat units, other than those excepted on the plans or by the next paragraph below, shall be provided with Webster Metering Orifices in the supply valve, union elbow or brass pipe nipple as shown on the plans. The orifices are to be sized by the manufacturer for the amount of radiation, the distance (equivalent pipe length) of the radiator from the source of steam supply, the basis on which the piping system has been sized and when necessary, for altitude; and to provide fully heated radiators during period of maximum heat requirements. The Heating Contractor shall install the proper size orifice for each radiator according to the plans and to the instructions furnished by the manufacturer.

Intermediate Metering Orifices

Webster Intermediate Metering Orifices shall be provided in branch mains to assist in primary distribution. The sizing of these intermediate orifices shall be done by the Manufacturer and shall be installed by the Heating Contractor at the locations designated on the plans. Intermediate orifices shall be of brass plate and provided with two copper-asbestos gaskets spot welded to the plate. Suitable lugs for mounting in pipe lines shall be included.

Radiation (Webster System)

Furnish and install concealed radiators as manufactured by WARREN WEBSTER & COMPANY and of size and type shown on plans. Installation shall be as recommended by the manufacturer. All radiators shall have thermostatic traps and supply valves built integrally into bronze headers. The tubes and fins of the heating element shall be made from non-corrosive metals. Tubes and headers shall be connected by Mueller Streamline Joints. The thermostatic trap interior shall have a renewable seat and 60° cone valve piece. The supply valve shall be of the quick-opening, non-rising stem type and shall include an improved molded ring packing with screwed take-up adjustment gland. The valve disc shall be standard Jenkins composition and shall be assembled with a shake-proof washer to permit easy renewal. Each supply valve shall be equipped with a sleeve-type metering orifice sized for the individual radiator. Orifice sizes shall be those recommended by the manufacturer for the uniform distribution of steam throughout the heating system.

Traps

All radiators (heat cabinets, concealed heat units, etc.) shall be provided with Webster Traps of size as designated on the plans. All unit heaters shall be provided on the return end with a Webster Drip Trap and Webster Dirt Pocket or Dirt Strainer as indicated.

BASEMENT RETURN EQUIPMENT

Vent Trap and Boiler Return Trap

(Use for Webster Type "R" System)

Furnish and install at the end of the dry return a Webster Vent Trap to vent the air from the system. Connect the vent trap discharge through a Webster 45 degree Check Valve to a Webster Boiler Return Trap to return the water of condensation to the boiler. The boiler return trap discharge shall connect into the boiler return header through a Webster 45 degree Check Valve. These traps shall be installed in accordance with details on plans and as recommended by the manufacturer.

Vent Trap

(Use with "street" steam)

Furnish and install at the end of the dry return a Webster Vent Trap to vent air from the system. This Trap shall be installed in accordance with details on plans and as recommended by the manufacturer.

Condensate Pump and Receiver

(Use where required)

Furnish and install complete on concrete foundation in accordance with manufacturer's details and instructions a No. Condensation Pump and Receiver to return the water of condensation to the boiler. Pump shall have a rated capacity of sq. ft. of radiation and shall be as manufactured by

It shall be provided with a G. E. Capacitor to eliminate radio interference.

Motor for pump shall be designed for current available at the building.

Pump shall be capable of discharging against a pressure of lbs.

The discharge from pump shall be provided with a check valve and a gate valve.

All electrical work in connection with wiring of motors shall be done by Heating Contractor from outlet left by Electrical Contractor.

Vacuum Pump

(Use for Webster Vacuum System)

Furnish and erect complete on a concrete foundation in accordance with manufacturer's drawings, one size duplex unit Vacuum Pump as manufactured by.....

Each pump shall be designed for automatic operation and shall have separate cut-out switch for vacuum control and also provided with a G. E. Capacitor to eliminate radio interference.

The motor shall be wound to suit current characteristics available at the building.

Each pump shall have a rated capacity of sq. ft. of radiation and shall be capable of maintaining a vacuum of 10 in. of mercury at the pump when the system is in operation and discharging water of condensation against a pressure of lbs. gauge.

The suction line to the pump is to be provided with a gate valve and a suction strainer. Before the gate valve provide a by-pass to drain. In the discharge line from each pump place a check valve and a gate valve.

All electrical work in connection with wiring motors to be done by this Contractor from an outlet left by Electrical Contractor.

CONTROL EQUIPMENT (Optional)

WEBSTER MODERATOR CONTROL

(Electric-Type)

General

These specifications and accompanying plans are intended to describe the installation of Electric-Type Webster Moderator Control to provide central automatic throttling control of steam delivery in the Improved Webster System previously specified herein under "The System."

The steam supply to the heating system will be automatically controlled and delivery to each radiator apportioned in accordance with requirements determined by outdoor temperature. This automatic control will be supplemented by a centralized manual control to vary the supply of steam to the entire system above or below the normal requirements of this system.

The Heating Contractor shall furnish and install the following material in accordance with these specifications and accompanying plans:

- (a) Webster Outdoor Thermostat
- (b) Webster Variator(s)
- (c) Webster Control Cabinet(s)
- (d) Webster Main Steam Control Valve(s)

Outdoor Thermostat

Install outdoors a Webster Electric-Type Thermostat at a point (indicated on plans), (as directed by WARREN WEBSTER & COMPANY) and in accordance with Service Details. Thermostat to be placed outdoors away from any warm currents of air and shaded from the sun. It is to be mounted on suitable supports with the ventilating louvres facing north. All necessary material such as nuts, bolts, brackets, etc., shall be furnished by the heating contractor.

Control Cabinet and Variator

Install a Webster Electric-Type Control Cabinet and a Webster Variator at points (indicated on plans) (as directed by WARREN WEBSTER & COMPANY) and in accordance with Service Details.

Main Steam Control Valve(s)

Furnish and install in. Webster Main Steam Control Valve(s) in the main steam line at (a) point(s) indicated on the plans and in accordance with Service Details of the manufacturer. All material, special valves and fittings needed for installation of the by-pass, called for on Service Details of the manufacturer, must be furnished by the Heating Contractor.

Wiring for Electric Moderator Control Equipment

Furnish and install Graybar lead-covered No. 141-B Interphone Cable or equal between Thermostat and Variator (in conduit from Thermostat to point of entry to building) and between Variator and Control Cabinet. Furnish and install 4-wire cable between Control Cabinet and Main Steam Control Valve in accordance with Service Details and connect to 110 volt, 60 cycle, single phase power line. Provide soldered lugs on wires of Interphone Cable where same connects to binding posts of Thermostat, Variator and Control Cabinet. Solder lugs shall also be provided on 4-wire cable connecting Control Cabinet and Main Steam Control Valve. Special care must be taken to see that wiring connections to Variator are properly secured and braided. All solder connections between wires and lugs and between lugs and binding post must be made tight. All wiring connections must be thoroughly rung out in order to determine that proper contacts are made.

Piping for Electric Moderator Control Equipment

Provide and run a 3/4-in. steam line from a point in the steam main (at least eight pipe diameters from the Main Steam Control

Valve) to the Control Cabinet. Provide and run a $\frac{3}{4}$ -in. pipe from the Control Cabinet and graded to dry or vacuum return line. These lines shall be dripped through a Webster 0026-0 Drip Trap in accordance with Webster Service Details. All material, special valves and fittings needed for installation shall be furnished by the contractor.

Indoor Thermostat Overheat Limit Control (Optional)

(Include only when two or more Main Control Valves are required.) Furnish and install a (plain) (clock type) Thermostat where shown on plans and in accordance with manufacturers' Service Details.

Piping

These paragraphs must be added to Piping Clause under "The System" if Moderator Control equipment is specified.

Where steam is used to generate hot water the supply connection to the hot water generator must be taken off ahead of the Main Steam Control Valve.

Where steam is used for indirect heating surfaces (unit heaters, hot blast stacks, etc.), the supply main to this indirect radiation must be taken off ahead of the Main Steam Control Valve.

All lifts in vacuum return mains must be avoided and returns so arranged that condensation will flow by gravity to the pump room. Where needed a lift may be installed at the pump.

(The following paragraph should also be included if intermediate orifices are specified.)

All branch mains shall be provided with flanges where connection is taken from the main so that intermediate orifice plates may be installed in a manner to be accessible.

WEBSTER HYLO STEAM VARIATOR CONTROL

These specifications and accompanying plans are intended to describe the installation of Webster Hylo Steam Variator Control, to provide manual, central throttling control of steam delivery to all radiators in the Improved Webster System previously specified herein under "The System."

Steam deliveries to radiators will be controlled by varying pressure difference between the supply and the return piping through manual setting of the Hylo Steam Variator weights.

The Heating Contractor shall furnish and install a size _____ Webster Type E Steam Control Valve in the supply main and a Webster Hylo Steam Variator at the location designated, in accordance with these plans and specifications. All connections both piping and electrical shall be as called for on the plans or as shown by Service Details of the manufacturer.

The Hylo Steam Variator shall be provided with a lever arm having clearly worded scales and adjustable weights. The Hylo Steam Variator Control shall be capable of controlling the steam supplied to the entire heating system from 140% of full load down to approximately one-third of full load.

Overheat Limit Control (Optional)

The Hylo Steam Variator shall be furnished with automatic Overheat Limit Control consisting of thermostat with (without) clock. Thermostat shall be installed where noted on plans. All

electrical connections shall be done by the Heating Contractor (from outlets left within 5 ft. of the apparatus by the Electrical Contractor).

WEBSTER ELECTRIC HYLO CONTROL

These specifications and accompanying plans are intended to describe the installation of Webster Electric Hylo Control to provide central manual control of steam delivery to all radiators in the Improved Webster System previously specified herein under "The System."

Steam delivery to radiators shall be in short intervals of varying length. The length of interval shall be determined by a manual setting of the Electric Hylo Controller.

Electric Hylo Controller

Furnish and install a Zone Electric Hylo Controller at location indicated on plans and in accordance with Service Details of the manufacturer. The Controller shall be provided with graduated dials enabling operator to set regulating knob in accordance with outdoor temperatures. Suitable toggle switches to close and open Main Control Valve(s) (and Motorized Bypass Valves) shall be included with the Controller. All wiring from electric supply outlet to Controller and from Controller to Main Valve(s) (and Motorized Bypass Valves) (and Overheat Limit Control Thermostats) shall be done by the (heating) (electrical) Contractor.

Main Steam Control Valve(s)

Furnish and install Webster Type Main Steam Control Valve(s) of the size(s) and at location(s) indicated on the plans and in accordance with Service Details of the manufacturer. All material, special valves and fittings needed for installation of the (regular) bypass called for on the plans must be furnished by the Heating Contractor.

Orificed Bypass (Optional)

Provide (in addition to the regular bypass) a special Orificed Bypass around each Main Steam Control Valve as indicated on the plans. This special Bypass shall be inches pipe size and shall include a inch Webster Type Orifice, (a inch Type Motorized Shut-off) (a inch Type Pressure Reducing Valve). All material, special valves and fittings needed for installation shall be furnished by the Heating Contractor.

Indoor Thermostat Overheat Limit Control (Optional)

Furnish, install and wire a Type (plain) (Clock) Thermostat where shown on plans and in accordance with Service Details of the manufacturer.

Miscellaneous Electrical Equipment

All relays, transformers and other electrical devices indicated on wiring diagrams and not included with other control equipment by the manufacturer shall be (furnished) (installed) (and wired) by the (heating) (electrical) contractor.

CONCLUSION

Painting

Note: Here specify that portion of the installation to be painted by the Heating Contractor. Under certain conditions it may also be advisable to list or describe here items to be painted by the Painting Contractor.

Covering

Note: If other than a jacketed boiler is used then specify here covering for the boiler and also covering for pipes, tanks, traps, breeching, etc., as may be required.

Test and Cleaning Boiler and System

When the work embodied in these specifications has been completed but before covering is applied the entire system shall be tested at a pressure of ten pounds per sq. in. and condensation wasted to drain for first two days to rid system of dirt, grease, oil, etc. Cold water is to be fed into boiler to prevent breakage while condensation is being wasted.

After the system has been made tight at this pressure, the boiler shall be cleaned in the following manner:

The safety valve shall be removed and a quantity of washing soda placed inside of boiler and the safety valve replaced. Run temporary valved overflow line to waste from main header drop and from drips at ends of supply mains. Start a moderate fire so

that the foaming of the boiler will cause flow of oil and grease to waste through these drip lines, at the same time feeding the boiler with water to prevent injury to same. The washing out process should be continued until the water line in boiler remains steady. After the boiler has been cleaned the drips to waste can be removed and the system put into regular operation. If more oil from the mains washes back to the boiler at a future date, the cleaning out process should be repeated.

All fuel for making test and cleaning out system shall be furnished by the Heating Contractor

Guarantee

The Heating Contractor shall guarantee all apparatus and equipment, in addition to the guarantee of the manufacturer, for a period of one (1) year from date of acceptance and shall make good any defect of material or workmanship occurring during that period, without expense to the owner.

SPECIAL NOTICE

To protect ourselves in our constant endeavor to make Webster Systems of Steam Heating and Webster System equipment ever better, we reserve the right to change specifications and prices without notice.

MODERNIZATION

A Webster Heating Modernization Program will result in improved heating service and lower heating costs for *most* large office buildings, apartments, hotels and similar structures. In many cases the reduction in heating cost is sufficient to liquidate the investment in modernization in from one to five years.

Building owners may borrow under the provisions of the National Housing Act to finance Webster Heating Modernization. Full details will be supplied by the nearest Webster Branch Office, entirely without obligation.

Address:

WARREN WEBSTER & COMPANY

Camden, New Jersey

